FINAL

MARINE CORPS BASE HAWAII INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UPDATE (MCBH INRMP)

(2007 – 2011)

Marine Corps Base Hawaii
November 2006

FINAL

MARINE CORPS BASE HAWAII
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN UPDATE
(MCBH INRMP)

(2007-2011)

Prepared for:

Marine Corps Base Hawaii

Prepared by:

Environmental Compliance & Protection Department, G4,
Marine Corps Base Hawaii
Box 63062, MCBH Kaneohe Bay, HI 96863-3062

and

Sustainable Resources Group Intn'l, Inc.
1916 Young Street, Suite 101, Honolulu, HI 96826

November 2006

Approved by:

M. A. DUNGAN
Colonel, U. S. Marine Corps
Deputy Commander, Marine Corps Base Hawaii

13 DEC 2006
Date

TABLE OF CONTENTS

APPENDICES (SEPARATE VOLUME)

ACRONYMS AND ABBREVIATIONS

AAV	Amphibious Assault Vehicle
ACOE	Army Corps of Engineers
AFS	Air Force Station
AIS	Aquatic Invasive Species
BASH	Bird Aircraft Strike Hazard
BMP	Best Management Practice
CATEX	Categorical Exclusion
CEMP	Code of Environmental Management Principles
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESU	Cooperative Ecosystem Studies Unit
CFR	Code of Federal Regulations
CG	Commanding General
COA	Course of Action
ComS	Compliance-focused Stewardship Alternative
CMC	Commandant Marine Corps
CREMS	Coral Reef Ecosystem Management Study
CSSG	Combat Services Support Group
CWA	Clean Water Act of 1972
CWCS	Comprehensive Wildlife Conservation Strategy
CY	Calendar Year
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act of 1972
DEM	Digital Elevation Model
DLNR	Department of Land and Natural Resources, State of Hawaii
DOCARE	Division of Conservation and Resources Enforcement
DoD	Department of Defense
DOH	Department of Health, State of Hawaii
DOI	Department of the Interior
DON	Department of the Navy
EA	Environmental Assessment
ECE	Environmental Compliance Evaluation

ECPD	Environmental Compliance and Protection Department
ECPSOP	Environmental Compliance and Protection Standard Operating Procedure
EEWF	Emergency Environmental Work Force
EFD	Engineering Field Division
EFH	Essential Fisheries Habitat
EGIS	Environmental Geographic Information System
EIRB	Environmental Impact Review Board
EIS	Environmental Impact Statement
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ERP	Emergency Response Plan
ESA	Endangered Species Act
FGDC	Federal Geographic Data Committee
FNSI	Finding of No Significant Impact
FR	Federal Register
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Hawaii Administrative Rule
HIARNG	Hawaii Army National Guard
HQ	Headquarters
HRS	Hawaii Revised Statutes
HSL	Helicopter Squadron Light
IAFWA	International Association of Fish and Wildlife Agencies
ICRMP	Integrated Cultural Resources Management Plan
IIMS	Injury Illness Mortality and Salvage
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
ISMS	Invasive Species Management Study
ISO	International Organization for Standardization
LE	Environmental Department, MCBH
LF	Facilities Department, MCBH
MARFORPAC	Marine Forces Pacific
MBTA	Migratory Bird Treaty Act
MCAF	Marine Corps Air Facility
MCAS	Marine Corps Air Station
MCBH	Marine Corps Base Hawaii

MCBH-CS	Marine Corps Base Hawaii, Camp Smith
MCBH-KB	Marine Corps Base Hawaii, Kaneohe Bay
MCCS	Marine Corps Community Services
MCDC	Mokapu Central Drainage Channel
MCO	Marine Corps Order
MCTAB	Marine Corps Training Area, Bellows
MEF	Marine Expeditionary Forces
MMRP	Military Munitions Response Program
MOU	Memorandum of Understanding
MP	Military Police
NAVFAC	Naval Facilities Engineering Command
NDSA	Naval Defensive Sea Area
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOSC	Naval Ocean Systems Center
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NPWMA	Nu‘upia Ponds Wildlife Management Area
NRDA	Natural Resources Damage Assessment
NSDI	National Spatial Data Infrastructure
NWP	Nationwide Permit
O&MMC	Operation and Maintenance Marine Corps
OISC	O‘ahu Invasive Species Committee
OPBUD	Operating Funds
OperS	Operational Stewardship Alternative
OptiS	Optimal Stewardship Alternative
ORV	Outdoor Recreational Vehicle
OSD	Office of the Secretary of Defense
POC	Point of Contact
PUA	Public Use Actions
ROICC	Resident Officer-in-Charge-of-Construction
SAIA	Sikes Act Improvement Act
SARA	Superfund Amendments and Reauthorization Act
SDS	Spatial Data Standards
SHA	Species/Habitat Enhancement Actions
SOP	Standing Operating Procedure
UFP	Unified Federal Policy
UH	University of Hawaii

UHWMA	Ulupa‘u Head Wildlife Management Area
USC	United States Code
USCINCPAC	Commander in Chief, US Pacific Command
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
WACO	Western Area Counsel Office
WMA	Wildlife Management Area

1

SECTION 1
PREFACE

Marine Corps Base Hawaii (MCBH) is a busy military installation with rich biological diversity and other unique natural resources; balancing combat readiness and conservation through a rigorously implemented Integrated Natural Resources Management Plan (INRMP).

MCBH's first 5-year $8M plan (a combined plan and environmental assessment), covered the period 2002 – 2006. This document is an updated plan covering the same level of investment over the next five year time frame (2007-2011). Our INRMP is a "living" document, continuously improving with completion of each action, stakeholder input, environmental response evaluation, and annual progress review. This plan update documents progress made over the previous five years and additional management actions programmed over the next five years to continue this progress. It summarizes a broad array of management actions completed and planned, across seven component Course of Action categories: Fish and Wildlife, Wetland, Watershed, Coastal and Marine Resources, Grounds Maintenance and Landscape, Quality of Life/Outdoor Recreation/Outreach, and Resource Information Management.

While the increased tempo of military training since "9-11" (i.e., the September 11, 2001 terrorist attack) and changing environmental conditions (e.g., prolonged drought in 2003) have caused some shifts in project implementation sequence during the first five years of its implementation, MCBH's overall INRMP has thus far been adequately funded and implemented on time and within budget.

Favorable stakeholder review is reflected in MCBH having won the 2005 Department of Defense natural resources conservation award in the "small installations" program category, and 2001, 2003, and 2005 Secretary of Navy awards in the same category, as well as a 2005 individual Secretary of Navy award to MCBH's Senior Natural Resources Management Specialist – whose main responsibility is for INRMP development and implementation. Favorable regulator review is reflected in a June 28, 2005 US Fish and Wildlife Service letter MCBH received for "excellent progress" in INRMP implementation and for "thoughtful and creative approaches that have been built into INRMP project planning and execution at MCBH "that have…resulted in tangible benefits to Federal trust resources," as well as a 2005 Certificate of Recognition from the Service received on May 12, 2006 for "outstanding efforts for natural resources conservation." (See Appendices G-2 and G-3 for further details).

The types and levels of management actions in the original and updated INRMP show a strong supportive relationship among conservation, military training, and public interest objectives. This reflects Section 101(b)(1)(l) of the Federal Sikes Act which states that each INRMP shall provide for "no net loss in the capability of military installation lands to support the military mission of the installation." 2006 US Marine Corps guidance on implementing INRMPs further states that "natural resources are not to be consumed by mission requirements, but sustained for mission requirements." To achieve this, "environmental programs and policies must protect the environment for the mission."

Finally, MCO P5090.2A, Section 11200.1 states a clear responsibility for Marine Corps installations to manage natural resources under their stewardship to support the military mission, while preserving, protecting and enhancing these resources for their "inherent values" and "to restore, improve, preserve and properly use" them "in the public interest." MCBH looks forward to continuing to implement its exemplary INRMP implementation efforts in compliance with this guidance in the years to come. Preserving the environment through "continuing to implement MCBH's Integrated Natural Resources Management Plan" is a stated goal in MCBH's overall Strategic Plan and is part of MCBH's Vision to be the Base of Choice for the 21st Century, by integrating people, technology, and systems into a world class team that supports combat readiness, community relations, and resource management and leads the Department of Defense in quality, cost control, and customer satisfaction."

This page intentionally left blank.

SECTION 2
EXECUTIVE SUMMARY

PURPOSE

This updated Integrated Natural Resources Management Plan (INRMP) guides implementation of Marine Corps Base Hawaii's (MCBH) integrated natural resources management program on MCBH properties. It complies with the Sikes Act Improvement Amendments (SAIA) of 1997 which require all military installations with significant natural resources to prepare, implement, and regularly review/update INRMPs. These plans must support "no net loss" in capability of the installations' lands and waters to support military readiness while complying with a suite of Federal laws governing natural resources management and stewardship, and public access to the same, subject to safety, environmental and military security constraints (see Appendix A3).

This INRMP is an update of the original 2001 MCBH INRMP/EA (Environmental Assessment) (Drigot et al. 2001), rather than a revision. As documented herein, management actions programmed and described in this plan cover a five-year time frame (2007 – 2011) (see Table 2-1 and Appendix E3) and are very similar to the level and type of management actions described in the 2001 INRMP/EA, covering the preceding five years (2002 – 2006) (see Table ES-1 and Appendix C of the 2001 INRMP/EA for comparison). In fact, some recurring actions or later phases of projects started in the time frame of the 2001 INRMP/EA straddle the time frame of the updated INRMP and show sustained momentum of effort toward continuous improvement in the various management action categories covered. As required, and as has occurred in the previous five years, the updated INRMP implementation will be reviewed annually for progress and updated, as appropriate, no less than once every five years (see Appendix E2). The next INRMP review and update is programmed to take place in fiscal year (FY) 2010 (see Table 2-2).[1] The INRMP, and the continuing review and update process required of it, help ensure support of the US Marine Corps (USMC) and MCBH's mission and vision by helping to maintain quality training lands and quality of life for the affected military population. It also complies with Federal laws and military directives to integrate military land use and natural resources management in a manner consistent with Federal and State stewardship requirements, while being responsive to host community and other stakeholder concerns. (See Section 3 for further details on the planning approach and structure of this updated INRMP and the current guidance followed in its preparation).

[1] The Federal fiscal year (FY) is October 1 – September 30 unlike the State of Hawaii FY that is July 1 – June 30.

COOPERATIVE PREPARATION

Per the SAIA, this updated INRMP has been prepared in cooperation with US Fish and Wildlife Service (USFWS), and Hawaii Department of Land and Natural Resources (DLNR) (the "cognizant State fish and game agency" required to be involved per the SAIA). Since the INRMP also covers coastal and offshore marine natural resources within Marine Corps Base Hawaii's Kaneohe Bay (MCBH-KB)'s 500-yard seaward security buffer zone around Mokapu Peninsula, the plan was also coordinated with National Oceanographic and Atmospheric Administration (NOAA) Fisheries. For a record of coordination with these and other stakeholder agencies, see Section 9 Stakeholder Involvement and Appendices G4 and G5, documenting stakeholder review and comment. Recent updated guidance, including a January 2006 Tripartite Memorandum of Understanding between the Department of Defense, US Fish and Wildlife Service, and the International Association of Fish and Wildlife Agencies, provides additional detail on the continuing policy of cooperation and coordination among these agencies in the preparation, update, and implementation of installation INRMPs (see Section 5 and Appendix A6). Appendix E2 contains documentation of MCBH annual progress reviews during the first five years of INRMP implementation and requests for input from Sikes Act partners in the review process.

CONTENT

The updated MCBH INRMP (2007-2011) is organized the same as the 2001 INRMP/EA (2002-2006) in so far as describing INRMP implementation. It covers the same geographic parcels included in the original INRMP/EA.[2] MCBH continues to follow an ecosystem management approach involving execution of a suite of many possible management actions within seven different Course of Action (COA) areas of concern that were carefully constructed during development of the 2001 INRMP/EA to represent the full array of natural resources and concerns found on MCBH properties. The overall plan content is discussed in further detail in Section 7.0 and the seven COA component plans that follow in subsections of Section 7: 7.1 Fish and Wildlife Management; 7.2 Wetland Management; 7.3 Watershed Management; 7.4 Coastal and Marine Resources Management; 7.5 Grounds Maintenance and Landscape Management; 7.6 Quality of Life, Outdoor Recreation, and Outreach Management; and 7.7 Resources Information Management. The management actions within each component plan can be grouped into alternative sets for implementation in differing combinations. Different groupings depend on factors such as which geographic parcel they apply to, the level of effort applied, and the impact of the effort on MCBH's capability to sustain both environmental compliance and the military mission (see Section 7.0 for further details).

IMPLEMENTATION LEVEL OF EFFORT

In general, across most MCBH parcels, within the structure of the plan described above, there are three alternative sets of management actions and levels of effort that can be undertaken to implement INRMP management actions: Operational Stewardship (Continuing Current Level of Action Effort, i.e., the "No Action" or continue the status quo alternative in the 2001 INRMP/EA), Compliance-focused Stewardship

[2] The INRMP covers three MCBH parcels on windward O'ahu in the Ko'olaupoko district: MCBH-KB on Mokapu Peninsula, Marine Corps Training Area Bellows (MCTAB) in Waimanalo, and Waikane Valley Impact Area in Waikane Valley. It also covers Camp H.M. Smith in Halawa Heights and Puuloa Training Facility on the 'Ewa coastal plain. See Sections 4 and 6 and Appendix B for further information on these locations and their environments.

(reduced level and type of effort), or Optimal Stewardship (increased level and type of effort). These are the same three alternative combinations of management actions and levels of effort considered for implementing MCBH INRMP management actions in the seven COAs within the 2001 INRMP/EA. Considering these alternative sets of actions and levels of effort during the INRMP development and update process helps to define the minimum/maximum range of management efforts possible within the INRMP implementation framework, while still adhering to relevant laws, regulations, and directives.[3] MCBH's commitment was to Operational Stewardship during the time frame of the 2001 INRMP/EA implementation. Since this updated INRMP continues the current "Operational Stewardship" level of management effort in implementing the integrated natural resources management program, no update to the NEPA (National Environmental Policy Act) analysis is required or contained in this document. See Table E3-2 in Appendix E3 for further detail.

Table 2-1. Number of MCBH INRMP Operational Stewardship Management Actions Planned for Yearly Implementation (CY07-CY11)

Course of Action Component	Number of Management Actions					
	Total	CY07	CY08	CY09	CY10	CY11
7.0: Overall Program Management	4	3	3	3	4	3
7.1: Fish and Wildlife Management	40	37	39	36	37	37
7.2: Wetland Management	16	8	12	9	10	10
7.3: Watershed Management	9	9	5	6	4	4
7.4: Coastal and Marine Resources Management	15	11	14	13	13	12
7.5: Grounds Maintenance and Landscape Management	16	13	14	12	14	12
7.6: Quality of Life, Outdoor Recreation, and Outreach Management	7	3	5	4	5	3
7.7: Resource Information Management	19	15	16	14	16	15
TOTAL	126	99	108	97	102	96

NOTE: The above number of management actions committed to over the next five years (i.e., 126) is similar to those committed to in the original INRMP/EA implementation time frame under the Operational Stewardship Level of Effort (i.e., 123). A more detailed table and breakdown is included in Section 3. The 'Total' column represents the total number of management actions contained within any COA component plan. The numbers in the CY columns represent the subset of this total that is scheduled for implementation in any given year.

This updated INRMP contains the details to clearly demonstrate MCBH's commitment to continue the same "Operational Stewardship" level of effort during the next five years (2007-2011) as in the first five years of INRMP implementation (2002-2006). The total number of management actions **(126)** and the total amount of funds **($8.745M)** committed to implementing the updated INRMP as compared to that displayed in the original INRMP/EA are very similar (compare Tables 2-1 and 2-2 of the updated INRMP

[3] In order to satisfy the National Environmental Policy Act (NEPA) requirements when the original INRMP/EA was developed, potential environmental impacts were analyzed and discussed for the three alternative sets of management actions considered (see Sections 5 and 8, and Appendix C of the 2001 INRMP/EA). Each Alternative comprised a set of programmatic actions which vary in intensity and duration over the time frame of the INRMP.

to Tables ES-1 (123 management actions) and ES-2 ($8.088M) in the 2001 INRMP/EA). Should there be a sudden significant change of mission, natural resource condition, or level of fiscal/staff support to the program during the next five years, the level of effort could be reduced to the "Compliance-focused Stewardship" level—i.e., doing only those actions that ensure minimum compliance with relevant laws and regulatory agreements. MCBH is committed to performing an "Optimal Level of Stewardship" management effort whenever the opportunity arises. For example, if an outside, unexpected source of funding or partner support facilitates MCBH conducting a "nice to have" management action in the "Optimal" category – such as installing additional environmental displays or interpretive brochures – MCBH would strive to accomplish this management action. There were occasions where this happened in the first INRMP implementation time frame and it can be reasonably expected to occur over the next five years as well. Defining a range of management action sets under alternative levels of effort within the bounds of Minimum, Operational, and Optimum Stewardship is an important part of setting the framework within which the INRMP can be implemented. It allows for a certain amount of flexibility and adaptability to changing conditions, while continuing to adhere to a defined minimum set of actions and effort levels across all the alternatives.

IMPLEMENTATION PROGRESS SINCE THE ORIGINAL 2001 INRMP/EA

November 2001 marked the beginning of MCBH INRMP implementation with the INRMP/EA. The plan was reviewed and concurred with by in-house stakeholders (e.g., MCBH Environmental Impact Review Board) and the INRMP/Finding of No Significant Impact was signed off by the Base commander and distributed for public review and comment (see Appendix G3). Required regulator concurrence was received from USFWS, NOAA Fisheries, and Hawaii DLNR as documented in Appendix H of the 2001 INRMP/EA.

In the five years since MCBH's INRMP/EA was completed, steady progress was made to implement the plan (see Appendix E2). At the time of this writing, most of the management actions planned in the 2001 INRMP/EA have been addressed, and all "must fund" discrete management projects (see Table 7.1, pg 7-3 of the 2001 INRMP/EA) are either completed or in-progress. Some actions were implemented ahead of schedule and some opportunities for optimal level of effort on management actions that were unforeseen in 2001 were exploited (e.g., due to regional partnering and conferencing initiatives). Some less critical management actions were deferred in order to address emergent priorities. Emergent priorities (e.g., increased tempo of military training since "9-11") and changing natural resource conditions (e.g., prolonged drought) caused shifts in project implementation sequence. MCBH's overall INRMP has thus far been implemented on time and within budget.

Details of steady progress summarized above are recounted in the annual progress reports sent to cooperative partners, as required, during the past five years, and are reprinted in Appendix E2. Other details about how successful INRMP implementation has been measured are presented in Section 7.0.7.

PROGRESS EXPECTED DURING THE UPDATED INRMP IMPLEMENTATION TIME FRAME

Section 7 of this INRMP documents past implementation of the INRMP as a context for presentation of updates for each set of management actions within the seven COA Component Plans. Supporting information includes documentation of past INRMP implementation progress (Appendix E2), and information relating to active and programmed management actions (Appendix E3). Details on the organization of the staff and funding to support implementation of the INRMP are presented in Section 4 and Appendix E4. Table E3-1 in Appendix E and summary Table 2-2 illustrate how funds will be invested across the seven COA components. The Operational Stewardship (Continuing Action) Alternative will invest the level of funding that has been consistently invested over the past five years at current levels of staffing and materials support. As described in this document, this level of effort is already beyond minimum compliance in all seven COA components. In keeping with ecosystem management principles of adaptive management and continuous improvement, sustaining the current level of effort does not preclude also implementing actions unique to the Optimal Stewardship action set. As has been the experience of the MCBH natural resources management program over the past twenty-five years, unforeseen opportunities often arise and will be readily used, when feasible, to complete "Optimal Stewardship" management actions in areas such as interagency partnering, community volunteer assistance, and securing supplemental funding sources.

Table 2-2: Summary Funding Plan for INRMP Implementation

(See Table E3-1, Appendix E3 for further details.)

Funding Category	Funding Amount ($M) CY2007-2011					
	07	08	09	10	11	Total
7.0: Overall Program Management: Labor, Materials, Training	0.480	0.506	0.533	0.561	0.591	2.671
7.0: Overall Program Management: Update INRMP (CY10)	0	0	0	0.250	0	0.250
7 COA Management Components	1.052	1.675	2.277	0.224	0.596	5.824
TOTAL	**1.532**	**2.181**	**2.810**	**1.035**	**1.178**	**8.745**

OTHER CONSIDERATIONS

The implementation of this INRMP will be consistent with other pertinent land use and natural resource-related plans, polices, and controls in the affected regions as described in Section 8. Section 9 describes how management actions in the updated INRMP will continue to achieve stakeholder participation in such areas as public involvement and outreach, interagency partnering, and cooperative conservation.

CONCLUSION

This updated INRMP demonstrates how MCBH will continue to achieve an overall ecosystem management goal of improving the sustainability and native biological diversity of the ecosystems of which it is a part, while supporting MCBH's military mission. This goal-driven document shows how MCBH will manage its natural resources by systematically adhering to specific objectives under each goal and to management actions listed under each objective. As a result, the following desired end states will continue to be achieved: support present and future mission requirements; preserve ecosystem integrity (at a scale and timeline compatible with natural and budgetary processes); recognize and address its influence on social and economic well-being of the communities affected (both military and host civilian communities); adapt to complex, changing requirements; and explore and engage in collaborative partnerships involving regional stakeholders with shared natural resources responsibilities and concerns, to the extent practicable. As such, this updated INRMP fulfills the requirements of the Sikes Act Improvement Act, other pertinent laws (e.g., Endangered Species Act) and military directives, including the requirements to sustain support of the USMC and MCBH mission and vision and to preserve, protect and enhance the inherent values of the natural resources held in the public trust and for the public interest on MCBH properties.

SECTION 3
INTRODUCTION TO INRMP AND PLANNING APPROACH

3.1 PURPOSE OF PLAN AND REVISION PROCESS

The purpose of this updated INRMP is to document that MCBH's INRMP has been reviewed and updated, where appropriate, to satisfy existing and emergent requirements during the next five-year phase of its implementation (2007-2011). The original plan providing the basis of this update is the combined MCBH Integrated Natural Resources Management Plan and Environmental Assessment (INRMP/EA) (Drigot et al. 2001), covering the first five years of INRMP implementation (2002-2006).

The 2001 MCBH INRMP/EA described program activities to be carried out from CY2002-2006, and also documented the history of natural resources management actions at MCBH during the preceding 20 years up to 2001. This document established that MCBH, through the INRMP, would continue to implement management actions at the same level of effort as during those preceding 20 years (i.e., the "Operational Stewardship" level of effort). In other words, there would be no significant change in the existing level and type of effort as carefully documented under seven Course of Action (COA) component plans: Fish and Wildlife Management, Wetland Management, Watershed Management, Coastal and Marine Resources Management, Grounds Maintenance and Landscape Management, Quality of Life, Outdoor Recreation, and Outreach Management, and Resource Information Management.

This updated document describes how the INRMP continues to comprise the same seven COA components, and updates the list of management actions where relevant to be current during the next five year phase of INRMP implementation (CY2007-2011). For example, if a study was completed during the first five year time frame and produced recommendations for follow-on actions, these follow-on actions are being programmed for implementation during this next five year period, where appropriate. This updated INRMP also reviews, documents, and builds upon progress that has been made in the component management areas during the first five years (CY2002-2006).

This updated MCBH INRMP continues to fulfill requirements of the SAIA of 1997, 16 U.S.C. §670a et seq.[1] It also continues to satisfy requirements of Department of Defense (DoD) Instruction 4715.3 and

[1] The SAIA requires all military installations with significant natural resources to prepare and implement integrated natural resource management plans (INRMPs). These plans must support the mission of the installation and comply with a suite of Federal laws governing natural resources management and protection, to include: (a) conservation and rehabilitation of natural resources; (b) sustainable multipurpose uses of resources to include hunting, fishing, trapping, and non-consumptive uses as appropriate; and (c) public access for such uses of natural resources, subject to safety and military security considerations. These plans must truly integrate with the military mission by showing how the installation will comply with natural resource laws in such manner as to ensure "no net loss in the capability

Marine Corps Order (MCO) P5090.2A which mandate preparation and implementation of an INRMP as the military's chosen vehicle for demonstrating compliance with an ecosystem approach to managing land and natural resources.

3.2 PLANNING PROCESS/APPROACH USED

The foundations of the planning process used for natural resource management at MCBH are described in Section 1 of the 2001 INRMP/EA (see also Appendix A1). Integrated natural resources management planning for DoD facilities is based on an ecosystem approach, as described in numerous guidance documents including "ecosystem management principles" in DoD Instruction 4715.3 (1996) and MCO P5090.2A (1998). The planning process used also draws on administrative management principles described in the Code of Environmental Management Principles for Federal Agencies (61 Federal Register (FR) 54062, October 1996) developed by the Environmental Protection Agency (EPA), as reinforced in Part 4 of Executive Order (EO) 13148, Greening of the Government Through Leadership in Environmental Management, and Marine Corps Base Hawaii's Strategic Plan.

Following an ecosystem approach as set forth in these various guides, the contents of the original INRMP/EA and this updated version both reflect how MCBH will achieve an overall goal of improving the sustainability and native biological diversity of the ecosystems of which it is a part, while supporting MCBH's military mission. This goal-driven document shows how MCBH manages its natural resources to support present and future mission requirements; preserve ecosystem integrity (at a scale and timeline compatible with natural processes); recognize and address its influence on social and economic well-being of the communities affected (both military and host civilian communities); adapt to complex, changing requirements; and explore/engage in collaborative partnerships involving regional stakeholders with shared natural resources responsibilities and concerns, to the extent practicable.[2] In sum, the original INRMP/EA and this update are written in such manner as to fulfill their purpose to help ensure maintenance of quality training lands and quality of life for the affected military population while also ensuring that land use and natural resources management are integrated and consistent with Federal and State stewardship requirements and responsive to host community concerns.

3.3 INRMP STRUCTURE

The updated INRMP has a similar structure to the 2001 INRMP/EA in so far as describing INRMP implementation in terms of completing a suite of management actions covering multiple natural resources and MCBH geographic areas. These management actions are displayed along a five-year implementation schedule across seven COA component plans, and are systematically linked to specific goals and objectives within each of those COA components. See Appendix E1 for a summary list of the goals and objectives. See Appendix E3 for a detailed summary of the management actions in the updated INRMP. The management actions within each component plan can be further grouped into Alternative sets for implementation. Different groupings depend on factors such as which geographic

---

of the installation's lands to support the military mission of the installation." Cited from Sikes Act Improvement Act, Section 2904, Preparation of Integrated Natural Resources Management Plans (see Appendix A2).

[2] Adapted from MCO P5090.2A, Section 11105.13 definition of ecosystem management.

parcel they apply to, the level of effort applied, and the impact of the effort on MCBH's capability to sustain both environmental compliance and the military mission.

Table 3.1 shows the seven COA components, the number of objectives under each COA component, and the number of management actions contained at various levels of effort: Compliance-Focused Stewardship (Minimum), Operational Stewardship (Proposed), and Optimal Stewardship. The individual management actions numerically totaled here are listed in detail in the relevant COA Component Plans (Section 7). A detailed spreadsheet showing all of the management actions and when they are programmed to take place across the five years covered by the updated INRMP is located in Appendix E3. A comparison of this table to Table ES-1 in the 2001 INRMP/EA shows a similar total and distribution of management actions across the various program COA component plans, further documenting that this updated INRMP is a continuation of the same "Operational Stewardship" level of effort described in the original INRMP/EA.

Table 3.1. Comparison of Alternatives, Course of Action Components, MCBH INRMP

Course of Action Component	Objectives	NUMBER OF MANAGEMENT ACTIONS		
		Operational Stewardship	Compliance-Focused Stewardship	Optimal Stewardship
7.0: Overall Program Management		4	4	4
7.1: Fish and Wildlife Management	8	40	25	68
7.2: Wetland Management	5	16	5	22
7.3: Watershed Management	5	9	6	16
7.4: Coastal and Marine Resources Management	6	15	7	22
7.5: Grounds Maintenance and Landscape Management	5	16	11	22
7.6: Quality of Life, Outdoor Recreation, and Outreach Management	3	7	5	13
7.7: Resource Information Management	7	19	7	25
TOTAL	**39**	**126**	**70**	**192**

Note: The current distribution among levels of effort compares to the spread in the 2001 INRMP/EA time frame (2002-2006): Operational Stewardship (123); Minimum Compliance (68); and Optimal Stewardship (208). The continuing "Operational Stewardship" level of action to be followed in this updated INRMP is highlighted.

The updated INRMP is structured differently from the 2001 INRMP/EA in the area of environmental impact analysis. The original INRMP/EA was developed as a combined management plan and programmatic environmental assessment and describes environmental consequences to be expected from its implementation. Since no significant change to the proposed action (Operational Stewardship) and level or type of effort is being considered in the next five years of INRMP implementation, this updated INRMP does not repeat this discussion of predicted similar environmental consequences. Interested readers are referred to the discussion of environmental consequences in Section 8 of the 2001 INRMP/EA for details.

The updated INRMP is structured similarly to the original INRMP/EA in that it does indicate, where appropriate, when additional site-specific environmental analyses, interagency consultations and/or permit applications are required and scheduled for specific projects being implemented over the next five years, due to the nature of that management action (e.g., excavations in waters of the United States, removing invasive plants from sensitive wetland/wildlife areas) (see Table 3.2, comparable to Table 7.1, page 7-3 in the 2001 INRMP/EA). Since this updated INRMP does not depart from the course of action in the 2001 INRMP/EA, it is not considered to be subject to Section 7 Endangered Species Act (ESA) consultation. However, individual project ESA consultations will be or already were performed for the projects specified in the table over the time frame of INRMP implementation.

Table 3.2. MCBH INRMP Active and Programmed Projects Requiring Section 7/NEPA/Permits (2005-2011)

Project Number	Project Title	COA	Level of NEPA Required	Sec 7 ESA Consult (Y/N)	Permits (Y/N)
HI0821015M	Sag Harbor Wetland Restoration	7.2.3	EA	Y	Y
HI60834	Wetland Restoration/Percolation Ditch Replacement	7.2.3	EA*	Y*	Y*
HI20013	Sustain Weapons Range-Install Erosion Control BMPs	7.3.1	CATEX*	N	N
HI0920013M	Install Erosion BMPs: Crater Slope and Shoreline	7.3.1	CATEX*	N	N
HI20010	Watershed Repair/Restore, MCDC	7.3.2	EA*	Y*	Y*
HI0820033M	Repair/Restore Waimanalo Stream, MCTAB	7.3.2	EA	Y	Y
HI0835636M	Erosion Control/Former Horse Trails, MCBH-CS	7.3.2	CATEX*	N	N

Notes: (1) The asterisk (*) denotes that this requirement has been completed but the project is still in a later phase of design or execution at time of this writing; (2) This table covers 2005 – 2011, which straddles the time frame of original INRMP/EA (2002-2006) and the updated INRMP (2007-2011). This is done to emphasize that some projects that were initiated during the first five years are almost, but not quite complete at the time the updated INRMP takes effect or have a later "phase" planned in the next five years of INRMP implementation.

3.4 UPDATED GUIDANCE FOLLOWED

A number of military handbooks and guidance documents have been published for implementing SAIA requirements and developing INRMPs consistently throughout the DoD. This updated INRMP follows the most recent Headquarters Marine Corps update of the *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (HQ USMC, April 2006). For further discussion of what this guidance consists of, see Section 5.2. Summaries of updated Sikes Act implementation guidance issued in the past five years are included in Appendix A5.

3.5 OTHER INFORMATION AND EVENTS INFLUENCING PLAN REVISION PROCESS

As documented in the annual progress reports submitted over the past five years of INRMP implementation (see Appendix E2), there have been a number of events and actions that have occurred which have had a noteworthy influence on prioritization of various management action completion schedules, accelerating some and delaying others. For example, an extended drought period in the early implementation phase of the 2001 INRMP/EA required increased emphasis on brush fire prevention and control activities at MCBH's Ulupa'u Crater and MCTAB. The terrorist's bombing of the World Trade Center on '9-11' and the consequent increased need for emphasis on force protection reduced somewhat the level of public access requests that could be accommodated and delayed the implementation of actions related to improving COA Component Plan 7.6 Quality of Life, Outdoor Recreation, and Outreach Management. The "stand up" of a new Conservation Law Enforcement program within the Marine Corps under MCO 5090.4 and the establishment of a new Conservation Law Enforcement billet and activities to carry out the mandates of this program resulted in a focus on staffing revisions and organizational realignments to accommodate program requirements.

3.6 RELATIONSHIP BETWEEN MILITARY TRAINING MISSION, INTEGRATED NATURAL RESOURCES MANAGEMENT MISSION, AND THE LARGER PUBLIC INTEREST[3]

The types and levels of management action efforts in the original and updated INRMP show a strong supportive relationship between conservation, military training, and the public interest objectives. This reflects guidance requirements as follows. Section 101(b)(1)(I) of the Sikes Act states that each INRMP shall, to the extent appropriate and applicable, provide for "no net loss in the capability of military installation lands to support the military mission of the installation." However, USMC implementation guidance goes on to state that "there may be instances in which a 'net loss' may be unavoidable to fulfill regulations other than the Sikes Act (for example, complying with a biological opinion under the Endangered Species Act or protecting wetlands under the Clean Water Act)." (p. 17, HQ USMC 2006). USMC guidance further states that "**natural resources are not to be consumed by mission requirements, but sustained for mission requirements**. To achieve this, environmental programs and policies must protect the environment for the mission" (*emphasis added*) (HQ USMC 2006). Furthermore, MCO P5090.2A, Section 11200.1 states a clear responsibility for Marine Corps installations to manage natural resources under their stewardship to support the military mission, while preserving, protecting,

[3] This section reflects policy about the interrelationship between the INRMP and USMC training as discussed in the *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (HQ USMC 2006).

and enhancing these resources for their "inherent values" and "to restore, improve, preserve and properly use" them "**in the public interest**" (*emphasis added*).

In light of the guidance summarized above, the updated INRMP (as in the original INRMP/EA) contains a major set of management actions devoted to erosion control, storm water management improvements, flood control, and invasive/flammable plant species removal/replacement in wildlife/wetland habitats and/or military training areas within MCBH control (e.g., Ulupa'u Crater, MCTAB, Puuloa). This will result in improved sustainability of these training platforms while also addressing legal mandates that MCBH be exemplary trustees of protected natural resources managed in the public trust on MCBH lands and waters.

Keeping these multiple objectives and mandates in mind, the updated INRMP retains the structure and content of the original document and has been updated/will be implemented in such a way as to continue to support Marine training use, ensure compliance with natural resources laws, and – to the extent practicable – integrate with regional ecosystem management goals as articulated in various public interest plans and documents (see Section 8). It will also be implemented with a mind to encourage cooperative conservation endeavors to the extent possible with Sikes Act partners and others (see Section 9.5 for further details).

3.7 STAKEHOLDER COORDINATION REQUIREMENTS

The SAIA requires that the INRMP be prepared, reviewed and updated in coordination with USFWS and the cognizant State fish and game agency, which is the Department of Land and Natural Resources (DLNR) in Hawai'i. Since MCBH also covers natural resources in the coastal and offshore areas within MCBH-KB's 500-yard buffer zone, coordination with NOAA Fisheries has also been carried out. A Memorandum of Understanding between the DoD, the USFWS and the International Association of Fish and Wildlife Agencies (IAFWA) (January 2006) provides additional detail on the continuing policy of cooperation and coordination between these agencies in the preparation, update, and implementation of installation INRMPs and management of natural resources on military installations (see Section 5.1.1 and Appendix A6). The SAIA further requires that the public be afforded an opportunity to review and comment on the plan during its preparation. Per USMC guidance, MCBH addressed the public participation requirement by having the 2001 INRMP/EA circulated for public comment through the NEPA process as further detailed in 40 Code of Federal Regulations (CFR) Part 1500 and in Chapter 12 of Marine Corps Order P5090.2A. See Appendix G for additional stakeholder participation throughout the implementation time frame of the original INRMP/EA.

SECTION 4
MCBH MISSION, VISION AND MANAGEMENT SETTING

4.1 MCBH MISSION AND VISION

The US Marine Corps (USMC) is the only Service specifically tasked by Congress to operate as an integrated combined arms force providing a joint force enabler in three dimensions – air, land, and sea. As the Nation's "911 Force," Marines are trained to be America's premier expeditionary total force in readiness, prepared to operate anywhere our national interests require within a moment's notice. Amphibious and maritime pre-positioning forces in which Marines engage play an ever-increasing role in supporting attainment of national objectives while protecting the United States' national interests.[1]

MCBH supports this Marine Corps Mission by:

- Maintaining facilities and providing services that support combat readiness and global projection of operating forces;
- Promoting the well-being, morale, and safety of military personnel, their families, and the civilian workforce.

MCBH's Vision is to be the Base of Choice for the 21st Century, by integrating people, technology, and systems into a world class team that supports combat readiness, community relations, and resource management and leads the Department of Defense in quality, cost control, and customer satisfaction. There have been no substantive changes in MCBH's Mission and Vision since 2001. Strategic Goal #6 in the MCBH Strategic Plan is "Preserve the Environment", with an associated implementation strategy of 'Continue to implement MCBH's Integrated Natural Resources Management Plan', whose performance is measured by the rate at which INRMP management actions are being executed (MCBH 2006).

4.2 TENANTS

MCBH supports a number of tenant commands. The major Marine operational commands include: 3rd Marine Regiment (Reinforced) (3rd Marines), Combat Service Support Group-3 (CSSG-3), and the Marine Air Group 24. These three commands are under administrative and operational control of the 3rd Marine

[1] Derived from Commandant of the Marine Corps, J. L. Jones, General, USMC, *Marine Corps Strategy 21*, Department of the Navy, Headquarters U.S. Marine Corps, Washington D.C. (3 Nov 2000) posted on http://www.concepts.quantico.usmc.mil/omfts/docs/omftsfinal.pdf.

Expeditionary Force (III MEF), headquartered in Okinawa, Japan. III MEF is one of two MEFs commanded by Marine Forces Pacific (MARFORPAC) located at MCBH Camp H.M. Smith.

The focus of the III MEF (Hawaii) is to execute amphibious assault and other required air/ground operations. This focus requires constant deployment of appropriately organized units of an air/ground task force. Units of the III MEF (Hawaii) may also be required to augment other Marine Corps air/ground task forces. Facilities provided by MCBH are primarily for support of the III MEF (Hawaii) units, including operational, maintenance, berthing, and personnel support.[2]

Other principal tenants on various MCBH properties include[3]:

- 3rd Radio Battalion – provides MEF units with signal intelligence and electronic warfare support
- Commander Fleet Logistics Support Wing VR-51 – provides logistics support for Navy-unique, fleet essential airlift mission requirements
- Naval Regional Medical Clinic – ensures medical readiness of Marine and Navy personnel and health care to various other units
- Naval Regional Dental Clinic – ensures dental operational readiness and augments medical support during combat, mass casualties and humanitarian missions
- Chaplains Religious Enrichment Development Operation – provides appropriate forms of ministry to military personnel and dependents
- Marine Forces Pacific Band – provides music for military ceremonies and other official activities
- 4th Force Reconnaissance Company – Marine Forces Reserve – provides trained Marines to augment active-duty forces or to mobilize as a unit to conduct pre-assault and deep post-assault reconnaissance and surveillance to support MEF elements
- Commander, Patrol Wings, US Pacific Fleet headquarters, 3 anti-submarine warfare squadrons, and a special purpose squadron
- COMPATWINGSPAC Shore Detachment Kaneohe Bay
- Anti-Submarine Warfare Helicopter Squadron Light-37 (HSL-37)
- VR-51 (Executive Transportation Squadron)
- Other naval aviation administrative, operational, training, supply, medical, and dental support personnel
- Hawaii Army National Guard (HIARNG)

[2] Derived from MCBH Master Plan (Wilson Okamoto and Associates 1999).
[3] See www.mcbh.usmc.mil/support.htm or http://www.mcbh.usmc.mil/plan/tenants.htm for latest and complete list of MCBH tenants.

4.3 LOCATION AND CURRENT USES OF MCBH PROPERTIES

MCBH is comprised of the following properties: 2,951-acre Kaneohe Bay (Mokapu Peninsula); 1,074-acre Marine Corps Training Area Bellows (MCTAB); 187-acre Waikane Valley Impact Area; 220-acre Camp H.M. Smith; 137-acre Puuloa Range Facility; 63-acre Manana Housing Area; 27-acre Pearl City Annex; and 12-acre Molokai Training Facility (see Figure 1, Appendix B). A brief summary of the location and current uses (including training activities) is included in this section.[4] For more detail, including a description of the history of acquisition of the properties, see the 2001 INRMP/EA (Sections 2.2 and 2.3).

As described in the 2001 INRMP/EA (Section 2.2), the INRMP does not cover those properties with no significant natural resources: Manana Housing Area, Pearl City Annex, and Molokai Training Support Facility. The other five properties do have 'significant natural resources' as indicated by the SAIA, and the management actions in this INRMP are designed to protect and enhance these resources.

Also not covered in this INRMP are non-MCBH parcels at various areas throughout the State within which MCBH-based units also train due to limited land available on MCBH. Most large training areas used by III MEF (Hawaii) are controlled by other DoD services (e.g., US Army at Makua, Island of O'ahu and Pohakuloa Training Area, Island of Hawai'i), other branches of government, or by private landowners. Those parcels outside MCBH that are within DoD control and have significant natural resources are covered by that host-installation's INRMP. While training on those non-MCBH parcels, MCBH units must adhere to the requirements of the host-installation's INRMP.

4.3.1 MARINE CORPS BASE HAWAII, KANEOHE BAY (MCBH-KB)

Marine Corps Base Hawaii, Kaneohe Bay (MCBH-KB) is located on Mokapu Peninsula in the Ko'olaupoko District of windward O'ahu. The base is bordered by the Pacific Ocean to the north, Kane'ohe Bay to the west, Kailua Bay to the east, and civilian residential communities of Aikahi Park and Kaimalino adjacent to MCBH-KB's Nu'upia Ponds Wildlife Management Area to the south. MCBH-KB occupies approximately 2,951 acres of land and exercises control of the 500-yard security buffer zone extending seaward from the shorelines.[5] MCBH-KB contains training areas, troop housing, residential

[4] Information in this section is derived from MCBH Master Land Use Plan (Wilson Okamoto and Associates 1999): MCBH-KB, MCBH-CS, Puuloa Training Facility, Waikane Valley Impact Area; Strategic INRMP for MCBH Properties (Tuggle and Wilcox 1998): MCBH-CS, Puuloa Training Facility, Waikane Valley Impact Area; Final EIS, Land Use and Development Plan, Bellows AFS (Belt Collins 1995): MCTAB. In addition, information is pulled from current Base Orders that regulate types of training and related restrictions dictated by environmental and other constraints at the various training areas including: Base Order P1500.9: Standing Operation Procedures for Marine Corps Base Hawaii Training Areas, Courses, and Facilities (Short Title: SOP for Ranges and Training Areas); Base Order 3574.6: Standing Operation Procedures for the Range Training Facility; and Base Order P5500.15B: Base Regulations.

[5] OPNAVINST 5500.11D, EO 8681 of 14 February 1941, and Section 1382, Title 18, US Code established a Naval Defensive Sea Area (NDSA) around MCBH-KB and eastward to Kapoho Point, O'ahu for the purpose of national defense. The US Government claims title to the entire NDSA. The Kane'ohe Bay Defensive Sea Area has been suspended by the Chief of Naval Operations, except for a 500-yard Security Buffer Zone surrounding the Mokapu Peninsula. The current representation of the buffer zone on maps depicts a polygon surrounding the peninsula and extending more than 500 yards from the shoreline. This Restriction Zone area is larger than the NDSA/500-yard Security Buffer Zone, which runs parallel to and extends 500 yards from the shoreline. In practice, the Restriction Zone acts as a buffer to the NDSA/500-yard buffer zone. However, MCBH has no enforceable jurisdiction in the area of the Restriction Zone outside the 500-yard defensive sea area (Tokarz 1985). The installation commander can

housing, administrative and operational buildings, wetlands, wildlife management areas, and personnel support facilities. (See map (Figure 4, Appendix B) and further discussion of the environmental aspects of MCBH-KB in Section 6.2).

Training Support: Aircraft operations are supported, including runways, landing pads, aircraft parking aprons, and various support facilities. MCBH-KB has a single operational runway (Runway 4/22) used by fixed-wing aircraft and helicopters and four landing pads used by helicopters. The airfield is operated by Marine Corps Air Facility (MCAF). The airfield normally operates for 18 hours per day Monday through Friday and for 10 hours per day on Saturday and Sunday. The airfield can also be opened for special exercises and as necessary. There is airport surveillance radar at tower atop Puʻu Hawaiʻi Loa and a Precision Approach Radar in Building 5036 near the runway.

Aircraft maintenance and hangar facilities are located in the southwest portion of MCBH-KB along the Kaneʻohe Bay shoreline. Related intermediate and mobile aircraft maintenance facilities are inland from the flight line area. Corrosion control and aircraft wash facilities are also located in this general area.

Supply/storage activities occur in various areas of MCBH-KB including general warehousing, air and ground units storage, cold storage, fuel storage, and open storage. Ordnance storage and handling operations occur in the magazines in the ordnance storage area on southern slope of Ulupaʻu Crater. Ordnance assembly operations occur at West Field and at the combat aircraft loading area across the runway.

Large areas of vehicle maintenance facilities occur primarily in the middle to eastern portion of MCBH-KB. For example, there are facilities to perform organizational maintenance functions on amphibious assault vehicles, on non-combatant vehicles used on MCBH, and on aircraft ground support equipment (e.g., tow tractors, trucks, fork lifts, trailers, and maintenance stands).

Training areas are located in several areas of MCBH-KB, with the largest area being the weapons training ranges in Ulupaʻu Crater. Other training occurs in the southeastern portion of MCBH-KB where the helicopter Tactical Landing Zone is located and an open maneuver field.

4.3.2 MARINE CORPS TRAINING AREA BELLOWS (MCTAB)

Marine Corps Training Area Bellows (MCTAB) occupies a 1,074 acre portion of the military controlled lands at Bellows (total of 1,568 acres) at the southern end of the Koʻolaupoko Region on the windward coast of Oʻahu. Bellows Air Force Station (AFS) controls the remaining 494 acres. It is located approximately 6.2 miles (10 km) south of MCBH-KB by sea. MCTAB provides limited training areas for small-scale actions and an important area for amphibious assaults and maneuvers for ground units at

---

increase the NDSA/500-yard buffer zone at any time for any reason relating to national security (Major J. Hitesman, Deputy Staff Judge Advocate, Marine Corps Base Hawaii, pers. comm. 2001) (Guidance found in: Commander, Pacific Division, Naval Facilities Engineering Command Memo 11011 Ser 2411/7359 of 25 July 1988; and Military Police Procedure 5500.12 MPP 5500.12 MP/KB of 18 December 1995) (see COA Component Plan 7.4, 2001 INRMP/EA, and Section 3.6.1, *MCBH Coral Reef Ecosystem Management Study*, Shafer et al. 2002).

MCBH. The northern end of the Bellows AFS beachfront is used for military recreation facilities and base support activities. The southern end of the beach is used for military training during the week, and is normally open for public use on weekends and holidays. A Regional Training Institute has been built on MCTAB land and is occupied by MCBH's tenant: Hawaii Army National Guard (HIARNG). It is located on a 48-acre site along the southern end of the parcel near Kalanianaole Highway and the Kahawai tributary to Waimanalo Stream.[6] Per guidance issued by the Secretary of Defense, HIARNG is expected to perform appropriate natural resources management actions within their leased land in a manner consistent with MCBH's updated INRMP.[7]

The Marine Corps and Air Force each have separate INRMPs for their respective parcels at Bellows and are in dialogue about closer coordination needed to improve partnering and possible cost-sharing on INRMP concerns of mutual interest and impact there (see 2001 INRMP/EA, Section 6.2.1 and related footnotes). MCTAB maintains control over the entirety of a recently-designated jurisdictional wetland on MCTAB (Upper Waimanalo Stream Wetland), and shares a small portion of jurisdiction with the Air Force over Lower Waimanalo Stream Wetland which straddles the property line separating MCTAB from Bellows AFS in Waimanalo Stream (see Figures 14a and 14b, Appendix B). Bellows AFS controls jurisdiction over most of Inoa'ole Stream, with MCBH controlling jurisdiction over only a portion of this intermittent stream, near its mouth by Waimanalo Bay. (See map, (Figure 12, Appendix B) and further discussion of the environmental aspects of MCTAB in Section 6.2).

Training Support: MCTAB supports training uses by the 3rd Marines and CSSG-3 units of the III MEF, the 1st Radio Battalion unit of Marine Forces Pacific (MARFORPAC), and by occasional visiting Marine Expeditionary Units (MEUs) in transit to other Asia/Pacific locations. The types of training use include amphibious assault, ship to-shore exercises, shore party engineer, small unit tactics, motor and tracked vehicles, field skills, command post, and helicopter flight crew training. Training is limited to small-scale ground maneuvers and specifically designated routes of ingress/egress to avoid impacts to environmentally sensitive areas and the nearby residential community. No live firing is allowed.

4.3.3 WAIKANE VALLEY IMPACT AREA

The Waikane Valley Impact Area consists of 187 acres and is located in Waikane Valley, at the northern end of the Ko'olaupoko Region on the windward coast of O'ahu. The land is currently unoccupied, ordnance-contaminated, and the range is closed. The area is secured in part by a four-strand wire fence, approximately 4400 feet long on the south perimeter and short portions of the east and west perimeters. It is scheduled for eventual clean up under DoD's Military Munitions Response Program (MMRP) (see Section 8.1.10).[8] MCBH-KB is currently responsible for security (e.g., law enforcement to prevent poaching), maintenance, and resource management, (e.g., periodic monitoring of natural resources

[6] This facility and non-significant environmental impacts of its construction and use are described in the Final Environmental Assessment, Establishment of the Regional Training Institute Complex of the Hawaii Army National Guard 298th Regiment, Bellows Air Force Station, Waimanalo, Oahu, Hawaii (Hawaii Army National Guard 1999). This EA was prepared when the HIARNG facility was under lease from the Air Force. Since the real estate property transfer of most of Bellows from Air Force to MCBH jurisdiction in October 1999, the HIARNG facility is now operated under a lease agreement with MCBH.

[7] Secretary of Defense Memorandum of 17 May 2006 re: Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands (see Appendix A5).

[8] For information see: https://www.denix.osd.mil/denix/Public/News/OSD/MMRP/mrsp-background.html.

status). Public access is prohibited due to unexploded ordnance exposure risk. No one enters the site on official business without proper clearances and EOD escorts. (See map (Figure 18, Appendix B) and further discussion of the environmental aspects of Waikane Valley in Section 6.3).

4.3.4 MARINE CORPS BASE HAWAII, CAMP H.M. SMITH (MCBH-CS)

Camp H.M. Smith is located in the leeward O'ahu uplands, near the town of 'Aiea. It is a 220 acre installation situated on the upper slopes of Halawa Heights at an elevation of approximately 600 feet above sea level. Major facilities include administrative and operational buildings, troop housing and personnel support facilities. Commander in Chief, US Pacific Command (USCINCPAC) and Fleet Marine Force Pacific are the major tenants sharing the complex, and Camp H.M. Smith is also the headquarters for the Commander, Marine Forces Pacific (MARFORPAC). The central military activities at Camp H.M. Smith are administration and community support for the major occupants of the office buildings and family housing units within the Camp. Camp Smith also operates a helicopter landing pad in accordance with Visual Flight Rules. The landing pad is located in an isolated area in the northwest portion of the Camp, with approach and departure clearance surfaces over undeveloped forest areas. (See map (Figure 20, Appendix B) and further discussion of the environmental aspects of MCBH-CS in Section 6.4).

4.3.5 PUULOA TRAINING FACILITY

Puuloa Training Facility occupies 137 acres on the coast, near Pearl Harbor, at the eastern edge of the 'Ewa Plain in leeward O'ahu. It is an active training facility used for small arms qualification and practice. (See map (Figure 23, Appendix B) and further discussion of the environmental aspects of Puuloa Training Facility in Section 6.5).

Training Support: USMC marksmanship training is supported at this facility using six live fire ranges. Rifle and pistol requalification and training are also conducted by units from the Navy and the Army. Federal, State, and local law enforcement also train here and local gun clubs are accommodated on a non-interference basis.

4.3.6 MANANA HOUSING AREA

The Manana Housing Area occupies 62 acres in leeward O'ahu, at the base of the ridge of the Ko'olau Mountain Range. It contains 168 housing units, and various recreation and personnel support facilities. It contains no significant natural resources and is minimally discussed in this INRMP.

4.3.7 PEARL CITY ANNEX

Pearl City Annex is a 27 acre site located within the Pearl Harbor Naval Complex on Pearl City Peninsula. There are three warehouses that provide a total of 212,160 square feet of covered storage space and an additional 41,968 square feet of space provided by two open-sided sheds. The facility is primarily used as a storage area for a wide range of material and equipment that cannot be stored at MCBH-KB due to

lack of space. It contains no natural resources and is minimally discussed in this INRMP.

4.3.8 MOLOKAI TRAINING SUPPORT FACILITY

The Molokai Training Support Facility (MTSF) is a 12 acre facility located near the Molokai Airport. Due to lack of current training activities on Molokai, the MTSF is no longer used. It contains no significant natural resources and is minimally discussed in this INRMP.

4.4 MANAGEMENT ENVIRONMENT

The 2001 INRMP/EA (see Sections 2.5.1 and 2.5.2) provides details regarding a strong tradition of exemplary natural resources stewardship and community involvement at MCBH, including the history of the natural resources program and staff development. This history of stewardship bears testimony to MCBH's commitment and ability to carry out the management actions programmed in this INRMP. This updated INRMP provides details on the current management environment supporting natural resources management at MCBH. As described below, the steady increase in numbers, expertise, and organizational complexity of the environmental staff, Environmental Department, Command Structure, and stakeholder support involved bear testimony to the continuing capability of MCBH to implement the management actions programmed in this INRMP.

The 1997 SAIA requires a single INRMP for MCBH to be used as the primary planning tool for managing natural resources on military lands. The initial MCBH INRMP was completed in 2001 (Drigot et al. 2001) as a combined INRMP/Environmental Assessment. Section 2.5.2 of that document details the prior history of natural resource management on MCBH properties. The INRMP is supported by previous plans and studies, which contain information that remains of historical value as a baseline reference. The INRMP will continue to be supported by future studies that are programmed to fulfill natural resource management needs.

4.4.1 STAFF AND ORGANIZATION

Over the past decade, the Environmental Department has been subject to staff increases, organizational changes, expansion in responsibilities to serve additional tenants and to accommodate increased organizational complexities, new legal compliance demands, and expanded amount of geographic area placed under their jurisdictional responsibility, in natural resources and all other areas of environmental management. Chart 4.1 shows how the Environmental Department fits into the overall MCBH Command structure. Chart 4.2 shows the most current organization and overall composition of the Environmental Department (although undergoing some minor changes at time of this writing). An important aspect is that the Environmental Department exists on co-equal footing with the Facilities and Supply Departments under the G-4 (Installation and Logistics) organizational unit on Base, with a direct line from there to the Commanding General.

At time of this writing, the Base Environmental Compliance and Protection Department (ECPD) is led by an active-duty military department director (currently a USMC Lieutenant Colonel, a trained attorney with additional Master's degrees in law and environmental management). Over the past few years, there have been two or three military and 23 civilian environmental professionals under his supervision, in functions distributed across the organizational Chart 4.2. Base natural resources are managed primarily by the natural resources staff within the conservation team of the ECPD, composed of a GS-12 team leader/senior natural resources management specialist; a GS-11 natural resource management specialist; a GS-9 bioscience technician, and—starting in FY2006—a GS-11 billet for a conservation law enforcement officer. Responsibilities of environmental staff in other divisions, including a GS-11 archaeologist/cultural resources manager, a GS-11 geographer (Geographic Information System (GIS) manager), and a variety of other environmental staff, often overlap with areas of natural resources concern. The natural resources core staff work closely with environmental staff on their own Conservation Team, and with the Pollution Prevention, Compliance, and Inspector teams in overlapping areas (e.g., storm water and erosion management, community outreach, spill response, recycling, pollution prevention, land development, and use of geographic information systems applications). The interaction among the Conservation, Compliance, and Pollution Prevention Teams in the day-to-day work of the Environmental Department reflects a growing recognition of the complexity and interdependencies among the various facets of the environment and the programs which manage them. For example, the watershed management action component of the INRMP is strongly cross-linked between the Conservation Team's Natural Resources and the Compliance Team's Clean Water activities.

A synopsis of the credentials, experience, and pertinent community service made by MCBH's natural resources professional "core" staff follows, demonstrating that MCBH satisfies the Sikes Act requirement that qualified natural resources professionals are implementing the INRMP and keeping it current:[9]

- The GS-12 Senior Natural Resources Management Specialist, on board since 1982, has an A.B. in Conservation of Natural Resources, from Barnard College, Columbia University; an M.S. and Ph.D. in Natural Resources (Policy, Planning, and Management) from University of Michigan (School of Natural Resources and Environment); and 35 years of professional experience in various positions as an environmental policy research analyst, a university professor/environmental studies program coordinator, an environmental impact consultant, and a natural resource manager. She is widely recognized for her 25 year long record of partnering with the military, regulators, and the public to steward MCBH natural resources while sustaining combat readiness. In 2005, she led MCBH in winning the 2005 Department of Defense and the Secretary of the Navy Natural Resources Conservation-Small Installation Awards and also won the 2005 Secretary of the Navy award in the Individual/Team category. She was instrumental in USFWS Honolulu Office nominating MCBH for a Military Installation of the Year Conservation Award in 2004, citing her for "thoughtful and creative approaches that have been built into INRMP project planning and execution at MCBH…resulting in…tangible benefits to Federal trust resources." In the past few years, she also has received individual recognition for her professional contributions in general, from both on- and off-base stakeholders. In 2005, she received special recognition from military operators for expediting interagency concurrence to test the next generation AAV prototype in sensitive MCBH marine waters,

[9] Excerpt from SAIA, Section 107 states: "To the extent practicable using available resources, the Secretary of each military department shall ensure that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out this title, including the preparation and implementation of integrated natural resources management plans."

and was MCBH's 2005 professional nominee for Federal Employee of the Year. In 2004 she was a Finalist for the Partnership for Public Service's "Service to America Medal," honoring the nation's top civil servants, and received 2004 Certificates of Recognition from Hawaii State Legislature; City/County of Honolulu Hawai'i, Hawai'i Audubon Society, and Native Hawaiian Civic Clubs Association. In 2003, she was named "Citizen of the Year" by the elected Kane'ohe Neighborhood Board for helping strengthen ties between MCBH and the community. Currently, she is a pro-bono, appointed affiliate graduate faculty member at University of Hawaii (UH), which also benefits MCBH's programs (e.g., she mentors UH graduate students pursuing degrees on natural resources management topics of interest to MCBH). She is also DoD's technical representative to the Hawaii-Pacific Cooperative Ecosystem Studies Unit (CESU), based at UH, comprising a dozen Federal, university, and research partner institutions spanning Hawaii and the Pacific (see Section 8.3.4 and Appendix G2 for details on the Hawaii-Pacific CESU).

- The GS-11 Natural Resources Management Specialist, on board since 1996, received two Bachelor's degrees (in Forestry and Business Finance) from the University of Montana and is a Certified Arborist (2001). He is a US Marine Corps veteran; a Lieutenant Colonel in the Marine Corps Reserves; has served hundreds of off-duty hours as a Commissioned Conservation Resource Enforcement Officer for the State of Hawaii Division of Conservation and Resource Enforcement (DOCARE); and has experience as a State survey forester with the Hawaii DLNR. He is a DoD-certified pesticide applicator in five categories and oversees implementation of MCBH's Pest Management Plan. For most of the five year period since the 2001 INRMP/EA was implemented, he served the nation as a Lieutenant Colonel on active Marine Reserve duty. The Environmental Department was ably assisted in his absence by interagency partnering and contractor help.

- The GS-09 BioScience/Natural Resources (Wildlife) Technician, on board since 1997, is a US Marine Corps combat veteran, and serves hundreds of off-duty hours as a Commissioned Conservation Resource Enforcement Officer for State of Hawaii DOCARE. He has also served six years as a Wildlife Technician for the State of Hawaii Division of Forestry and Wildlife. He has completed numerous job-related certified training courses such as in fish and wildlife law enforcement, advanced boat operators' training; bird/aircraft strike hazard abatement, predator and nuisance wildlife control; and in dealing with marine mammal entanglement. In FY03, pending the full establishment of MCBH's new Conservation Law Enforcement billet, the current BioScience Technician became the first USMC student to complete rigorous 3-month Federal law enforcement training and began to perform duties of a commissioned Federal conservation law enforcement officer, thus helping to launch USMC's conservation resource enforcement program detailed in a new Marine Corps Order (MCO 5090.4). In 2005, USMC recognized his outstanding help to "stand up" and design training classes for the new USMC program based on his extensive experience. As a USMC combat veteran and dual-commissioned State and Federal enforcement officer, he mentors many young Marines, State and Federal law enforcement personnel, and successfully prosecutes numerous natural resources violations in both State and Federal courts. Prior to this initiative, there was no venue on MCBH to directly research, investigate, and process conservation law enforcement violations on Marine Corps property. Cases were "handed off" to overloaded State and Federal fish and wildlife law enforcement personnel to finalize the investigations. Now, due to the vigor with which he pursues his commissions and dedication to service, there is dramatic increase in awareness, training, and case load manageable by MCBH in partnership with State and Federal FWS enforcement personnel. No other military service to date has "stood up" such a program. During 2006, a personnel action is underway to separate out the Conservation Law Enforcement position from the established Wildlife

Technician position, so that two separate civil service positions will result: a GS-09 conservation law enforcement-focused technician and a GS-09 bioscience/wildlife-focused technician, under funding support already received from HQ USMC.

4.4.2 OTHER NATURAL RESOURCES SUPPORT

In addition to the Environmental Department staff, a number of natural resources support functions continue to be performed by other units or activities on and off Base.

- Environmental Impact Review Board: A Base-wide interdepartmental committee known as the Base Environmental Impact Review Board (EIRB) reviews staff actions regarding compliance with the National Environmental Policy Act (NEPA). It functions to ensure adequate review of the environmental impact of Base actions and helps the Commanding General implement other aspects of MCBH's natural and cultural resources and environmental quality protection programs as appropriate. The Deputy Commander of the Base is Chair of the Board and the Environmental Department Director serves as the EIRB Executive Agent.[10] The EIRB is the principal MCBH forum within which the original INRMP/EA was reviewed and approved, prior to acquiring the Commander's signature on the Finding of No Significant Impact (FNSI) for its implementation (see Appendix G3 for a copy of the signed FNSI). Its members continue to play that function in successive updates of the INRMP.
- Environmental Lawyer: This billet exists in the Organizational Chart (4.1) for the Base. While there are uniformed personnel who have occupied this billet, it is not always filled. If vacant, the duties are performed by the Staff Judge Advocate/Deputy Staff Judge Advocate. Environmental law assistance is always available to MCBH at the Marine Corps' Western Area Counsel Office (WACO), based in Camp Pendleton, California or at Headquarters Marine Corps. At time of this writing, the USMC Lieutenant Colonel that is occupying the Director, ECPD billet, helps supplement this function, as he possesses a law degree, and Master's degrees in law and environmental management.
- Military Police Animal Control Officers: Two Military Police Animal Control Officers now occupy recently civilianized billets at the Military Police Department to replace the Game Warden duties that have been consolidated and professionalized under the Conservation Law Enforcement position in the ECPD. These Animal Control Officers assist the Environmental Department by regularly patrolling specified areas on MCBH and reporting all natural resources non-compliance issues to law enforcement authorities (e.g., poaching, trespassing). They also assist by controlling domestic pets in residential areas when necessary, and transferring sick, injured, or dead protected wildlife to appropriate authorities. On occasion, when needed in an emergency, they supplement the environmental staff in responding to incidents involving wildlife injury caused by human-induced or natural disasters (e.g., oil spill, brushfire, hurricane, and flood).
- Other MCBH Departments: MCBH natural resources staff receive support in implementing the INRMP from other departments. For example, G-4 (Facilities Department) planners, engineers, engineering technicians, and surveyors, and shop laborers help plan, design, map, and/or implement various INRMP actions. G-3 (military operators) help execute INRMP actions with military operator assistance (e.g., annual "Mud Ops" maneuvers by Amphibious Assault Vehicles that enhances

[10] The scope of responsibilities and staff composition of the Base EIRB are described in further detail in Base Order 5420.1 Environmental Impact Review Procedures. Section 12302 of MCO P5090.2A directs that such an EIRB exist at each USMC installation to ensure Base compliance with NEPA.

nesting habitat for endangered Hawaiian stilt at Nu'upia Ponds. Waterfront operators provide vessel transport support for Federal marine resource surveyors performing coral reef inventories for MCBH and for MCBH conservation law enforcement officer in performance of his surveillance duties.

- Federal Fire Department: MCBH is among a minority of USMC installations that do not maintain their own fire department. Instead, a separate Federal agency – the Federal Fire Department – is the primary responsible party for responding to and directing all fire responses on MCBH, including structural fires and wildland fires on training ranges (Ulupa'u RTF, MCTAB and Puuloa). Fire fighting procedures for the Ulupa'u RTF are spelled out in Chapter 9 of BaseO 3574.6. BaseO 3000.1A Chapter 1 (Fire Bucket Standby Order) details responsibilities of military units to assist Federal or civilian firefighters in fighting fires that may occur on government-owned or leased lands or during State of Hawaii emergencies. These Base Orders are the responsibility of military operators (G-3) to keep up-to-date and an update is now in progress (2006).

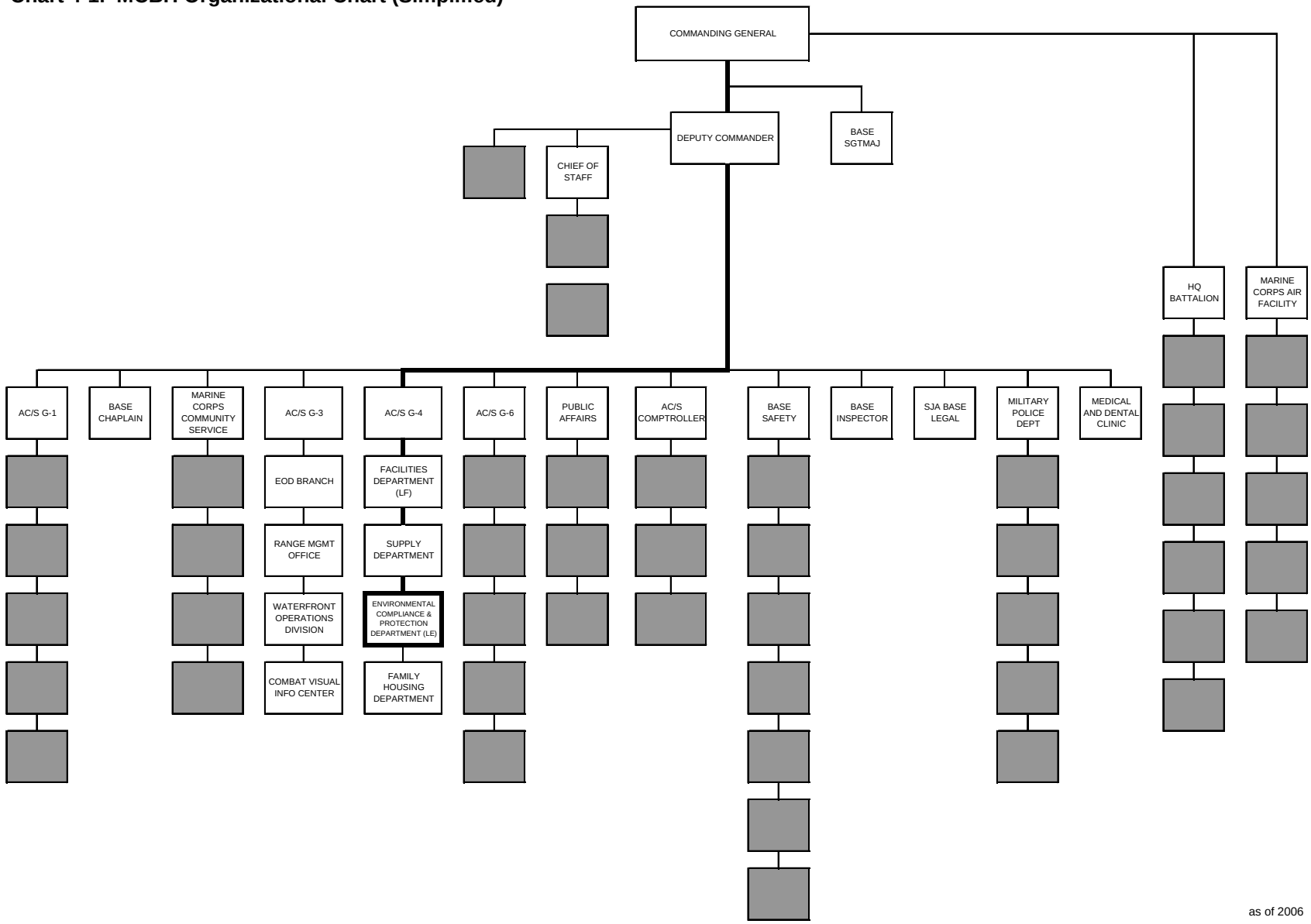
- Sikes Act Cooperators: MCBH receives support implementing its natural resource management actions from cooperating agencies under the Sikes Act, such as Hawai'i DLNR and USFWS wildlife biologists. NOAA Fisheries biologists, US Department of Agriculture (USDA) Wildlife Services, and Naval Facilities Engineering Command Pacific (NAVFACPAC) Engineering Field Division's (EFD), wildlife specialists, applied biologist, and environmental engineers also assist when needed.

- Other Public and Private Agency Expertise: MCBH receives support implementing its natural resource management actions from various other agencies, universities, museums, non-governmental organizations and citizen groups, including Native Hawaiian groups and *kupuna* (elders with traditional knowledge), whose research, resource monitoring, and/or educational visits have been hosted on MCBH in exchange for expanded knowledge of resources under MCBH stewardship and their functions.

- Volunteers: Through continuing community outreach and involvement, the natural resources staff has enjoyed assistance from thousands of dedicated volunteers over the past twenty-five years, performing primarily wildlife habitat improvement and resource monitoring duties (See Section 9 and Appendix G1).

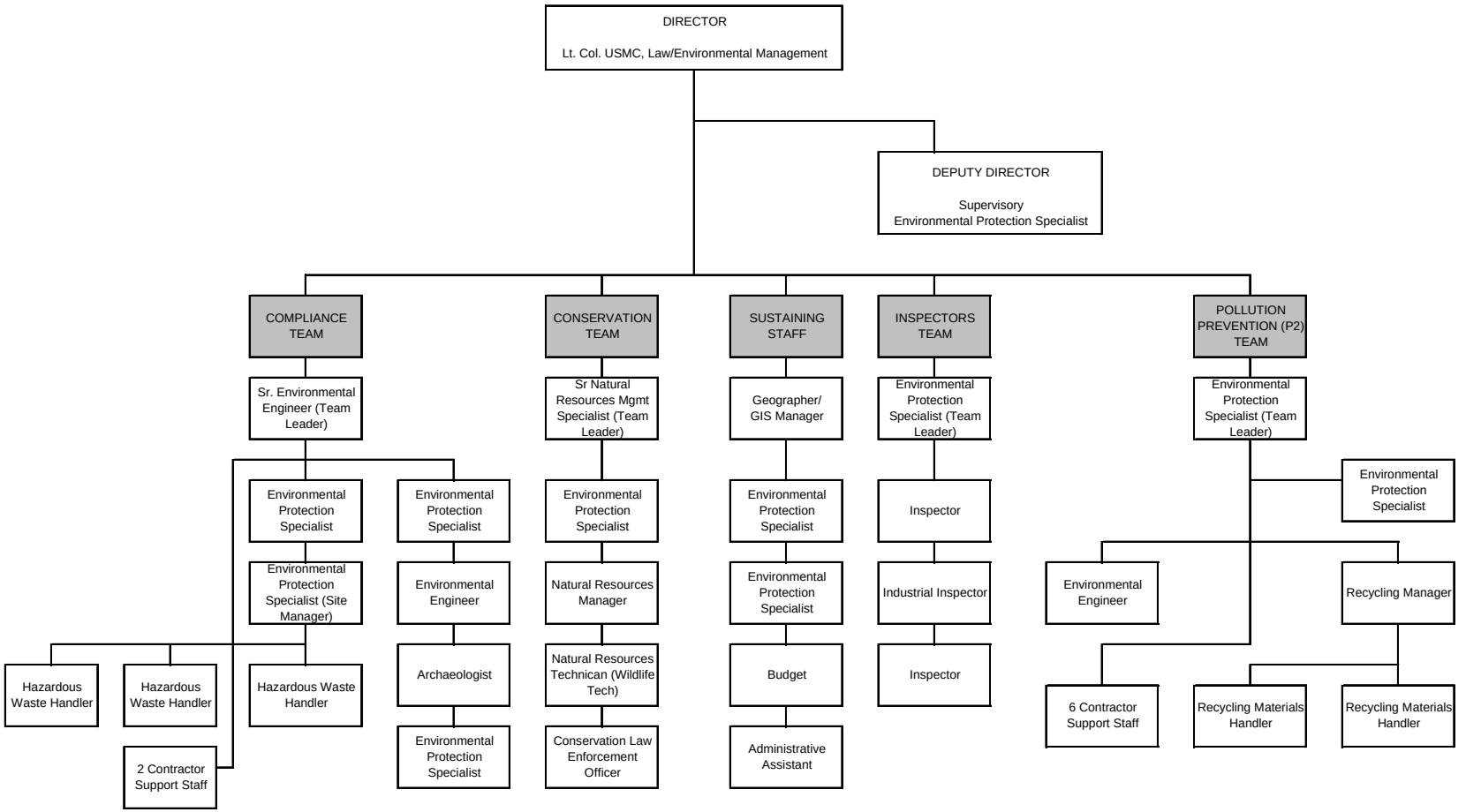
- Contractor Support: Many of the management actions assisting the natural resources functional area and described in this INRMP involve special studies or resource inventories, design and construction of special projects, establishment and/or implementation of various resource monitoring protocols, development or updating of various databases, which require expertise budgeted for and provided through assistance of contracted personnel. In recent years, contract management assistance in natural resources has come mostly through the MCBH Supply Department, US Army Corps of Engineers, NAVFACPAC, and Naval Facilities Engineering Service Center (NFESC) staff.

Chart 4-1. MCBH Organizational Chart (Simplified)



1

Chart 4-2. MCBH Environmental Compliance and Protection Department Organizational Chart



This page intentionally left blank.

SECTION 5
NATIONAL NATURAL RESOURCES MANAGEMENT MANDATES AND REGULATORY CONTEXT

5.1 APPLICABLE LAWS, REGULATIONS, AND OTHER DIRECTIVES

Appendix A2 contains a table and associated text summarizing the principal Federal and State laws, executive orders, regulations and other directives that influence MCBH's INRMP. This information has been updated to include relevant changes since 2001. Particular updates of interest are detailed in Sections 5.1.1 and 5.1.2.

5.1.1 LAWS, EXECUTIVE ORDERS, AND MEMORANDUMS OF UNDERSTANDING

Migratory Bird Treaty Act

In accordance with the Migratory Bird Treaty Act (MBTA) and Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*[1] (January 10, 2001), DoD and USFWS have cooperatively developed and signed a Memorandum of Understanding (MOU) that outlines a collaborative approach to promote the conservation of migratory bird populations (see Appendix A7). Per this guidance, USMC installations are to avoid or minimize the negative impact of actions on migratory birds, and take active steps to protect birds and restore or enhance their habitat whenever possible. This includes preventing or abating pollution or detrimental alteration of the environment, as practicable, and incorporating migratory bird conservation into agency planning processes whenever possible. USFWS should be notified if unintentional take of migratory birds, reasonably attributable to USMC actions, is having, or is likely to have a measurable negative effect on migratory bird populations, and implement conservation measures as specified in EO 13186, Section 3(e)(9). MCBH is following this guidance, for example, in the on-going level and types of management actions undertaken to sustain the red-footed booby colony at Ulupa'u Head Wildlife Management Area adjacent the active weapons fire training range there (see COA Component Plan 7.1.1 and COA Component Plan 7.5.3 for additional details). This MOU, coupled with the USFWS Migratory Bird Final Rule, which provides for incidental take (under the MBTA) on military training lands, will place more emphasis on military installation INRMPs. Additional guidance is found in USFWS Proposed Rule: Migratory Bird Permits; Take of Migratory Birds by Department of Defense, 50 CFR Part 21 (see Appendix A7), which, consistent with provisions in Section 315 of the 2003 National Defense Authorization Act, prescribes regulations to exempt the Armed Forces for the incidental taking of migratory birds during military readiness activities authorized by the Secretary

[1] This EO requires all Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within two years, a MOU with the USFWS to address management actions and conservation of migratory birds on their properties.

of Defense or the Secretary of the military department concerned.[2] USFWS is concerned, in particular, about the species listed in the report entitled *Birds of Conservation Concern 2002* (USFWS 2002).[3] MCBH has an on-going relationship coordinating with USFWS with regard to migratory birds – particularly on MCBH-KB, including protecting and improving bird habitat, documenting population size through bird counts, and complying with the terms of a depredation permit under the MBTA for use in the Bird/Aircraft Strike Hazard (BASH) program (see COA Component Plan 7.1.5). MCBH intends to continue the on-going level and type of effort currently underway to work with military operators and USFWS to sustain adherence to this guidance.

National Defense Authorization Act (NDAA) for Fiscal Year 2004

The National Defense Authorization Act (NDAA) for Fiscal Year 2004 made important changes in the ESA regarding INRMPs. Under new Section 4(a)(3)(B)(i) of the ESA, the Secretary of Interior or the Secretary of Commerce, as appropriate, is precluded from designating critical habitat on any areas owned, controlled, or designated for use by the DoD where an INRMP has been developed that, as determined by the Secretary of Interior or Secretary of Commerce, provides a benefit to the species subject to critical habitat designation.

Plant Protection Act

This act became law as part of the Agricultural Risk Protection Act in 2000. The Plant Protection Act (PPA) gives the Secretary of Agriculture, and through delegated authority, USDA's Animal and Plant Health Inspection Service (APHIS), the ability to prohibit or restrict the importation, exportation, and the interstate movement of plants, plant products, certain biological control organisms, noxious weeds, and plant pests. The PPA was amended to include the Noxious Weed Control and Eradication Act of 2004 which requires the Secretary of Agriculture to establish a program to provide assistance to eligible weed management entities to control or eradicate noxious weeds on public and private land.

[2] The rule authorizes take of migratory birds, with limitations, that result from Department of Defense military readiness activities. If the Department of Defense determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on the sustainability of a population of a migratory bird species of concern, then they must confer and cooperate with the USFWS to develop appropriate and reasonable-conservation measures to minimize or mitigate identified significant adverse effects. The Secretary of the Interior, or his designee, will retain the power to withdraw or suspend the authorization for particular activities in appropriate circumstances.

[3] "The 1988 amendment to the Fish and Wildlife Conservation Act mandates the U.S. Fish and Wildlife Service (USFWS) to 'identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973.' Birds of Conservation Concern 2002 (BCC 2002) is the most recent effort to carry out this mandate. The overall goal of this report is to accurately identify the migratory and non-migratory bird species (beyond those already designated as Federally threatened or endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action. The geographic scope of this endeavor is the United States in its entirety, including island 'territories' in the Pacific and Caribbean. It is more comprehensive than previous versions. BCC 2002 encompasses three distinct geographic scales–North American Bird Conservation Initiative Bird Conservation Regions, USFWS Regions, and National–and is primarily derived from assessment scores from three major bird conservation plans: Partners in Flight, the United States Shorebird Conservation Plan, and the North American Waterbird Conservation Plan" (USFWS 2002).

Executive Order 13352, Facilitation of Cooperative Conservation

The purpose of Executive Order 13352, signed in August 2004, is to "ensure that the Department of Interior, Agriculture, Commerce, and Defense and the [EPA] implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in Federal decision making, in accordance with their respective agency missions, policies, and regulations."

Memorandum of Understanding (Department of Defense, U.S. Fish and Wildlife Service and International Association of Fish and Wildlife Agencies)

In January 2006, the DoD, the USFWS and the International Association of Fish and Wildlife Agencies (IAFWA) signed a Memorandum of Understanding that will help manage natural resources on military installations, under provisions of the Sikes Act. The signatories developed the document, which encourages additional coordination and discusses cooperative elements of the Sikes Act, as well as calling for establishment of INRMP implementation teams (see Appendix A6).

5.1.2 MARINE CORPS GUIDANCE

Marine Corps Order P5090.2A, Environmental Compliance and Protection Manual

Natural Resource Chapter 11 and NEPA Chapter 12 of the Environmental Compliance and Protection Manual (MCO P5090.2A) have been updated by Headquarters USMC. They will be undergoing additional review and incorporation into the main document in 2006.

Marine Corps Order 5090.4, Conservation Law Enforcement Program

MCO 5090.4 establishes the policy and direction for the Conservation Law Enforcement Program on Marine Corps installations. This program is aimed at enforcing laws protecting natural and cultural resources. The MCO standardizes the following components of the program: organizational structure and reporting procedures; pre-requisites for conservation law enforcement officers; training requirements; commission and credentials; firearms rules and regulations; uniform, equipment, and vehicle requirements; and the civilian general service position series for conservation law enforcement officers. See Section 4.4.1 and COA Component Plan 7.1.8 for details on MCBH's Conservation Law Enforcement Program.

MCBH Environmental Compliance and Protection Standard Operating Procedures

The MCBH Environmental Compliance and Protection Department's Standard Operating Procedures (ECPSOP) was updated in December 2005. Chapters relevant to the MCBH INRMP include Chapter 1: Environmental Program Management System SOP (see below), Chapter 12: Natural Resources Management SOP, and Chapter 13: National Environmental Policy Act (NEPA). The goal of the ECPSOP is to provide guidance, written for and distributed to a general audience, as a means of orientation to the Base population (e.g., active duty Marines, Sailors, their family members, civilian employees, contractors, and visiting guests) to the mission of the Environmental Compliance and Protection Department (e.g., applicable statutes, program elements, and responsibilities of the various

component programs and staff); and to the basics of their responsibility to comply with environmental laws on the installation. In simple terms, for example, the Natural Resources Management section of the ECPSOP states that the information contained "provides information to help you understand what you must do to comply with the do's and don'ts regarding natural resources found aboard MCBH properties and where to get additional help to remain in compliance with applicable laws, regulations, and military directives."

Environmental Management System

The US Marine Corps uses an Environmental Management System (EMS) as a systematic approach to integrating environmental considerations into mission decisions and operations, while continuing to improve environmental compliance. The USMC EMS is a framework of five interrelated components, consistent with other military services and Federal agencies, and with International Organization for Standardization (ISO) 14001, an international standard. The components emphasize continual improvement through effective policy, planning, implementation, checking and preventive/corrective action, and management review.

Following USMC guidance, the Environmental Compliance and Protection Department, Logistics Branch (LE) maintains MCBH's *Environmental Management System (EMS) Manual* (MCBH 2005). This manual is MCBH's top-level environmental planning and compliance document, and is applicable to all operations at all its installations (with exception of the Navy Branch Medical and Dental Clinics). Other environmental planning documents, including this INRMP, have been organized within the framework of the EMS manual, and are part of the overall EMS. The EMS Manual describes the core elements of the EMS and their interrelationships by summarizing the basic components of the EMS and providing direction to the relevant documentation (such as plans, SOPs, and instructions). An example of overlap between the EMS and the INRMP is the EMS Aspect of Natural Resource Land and Watershed Disturbance (e.g., soil disturbance). Also, the INRMP/EA with its own internal organizational structure to systematically list management actions under objectives, and objectives under goals across seven COA components areas of the INRMP is consistent with the EMS emphasis on ensuring that the manner of carrying out environmental management is systematic, transparent, regularly reviewed and updated, and includes mechanisms for adaptive management and continuous improvement. There is a strong overlap between the approach to implementing EMS and the ecosystem management approach already implemented in the INRMP (see Section 3 for additional details).

5.2 INRMP GUIDANCE

Updated guidance for implementing SAIA requirements (see Appendix 3) consistently throughout the DoD is periodically issued by the Secretary of Defense. The most recent update of the *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* was issued in April 2006 (HQ USMC 2006). This handbook guides the preparation, revision and implementation of INRMPs in compliance with the recent Memorandums of Understanding and updated guidance from the Office of the Secretary of Defense (OSD). In particular, the MOU between the DoD, USFWS, and IAFWA was signed in January 2006 that establishes a cooperative relationship between DoD, USFWS and State fish and wildlife agencies in preparing, implementing and reviewing INRMPs on military installations (see Appendix A6). Additional guidance on implementation of

the SAIA has been implemented by the OSD to further clarify how to implement the requirements set forth in the SAIA. An emphasis of the guidance is on improving the overall INRMP coordination process. Summaries of the implementation guidance issued in the past five years are included in Appendix A5. In addition, DoD's Legacy Resource Management Program funded an update to the INRMP handbook for DoD natural resource managers, which is intended to assist managers in implementing their installaion's INRMPs (Gibb 2005).

5.3 NEPA

As per SAIA guidance, the 2001 INRMP/EA was developed as a combined management plan and environmental assessment, with the environmental analysis conducted at a programmatic level (see Sections 5 and 8 of the 2001 INRMP/EA). Per discussion with HQ USMC, this updated INRMP does not require a new or updated NEPA analysis since the proposed action and implementing level of effort has not changed. As per the 2001 INRMP/EA: "The proposed action is to implement an INRMP on MCBH lands using an ecosystem management approach over the time frame CY2002 – 2006; annually review implementation progress, as required; and update after each review, as appropriate, but no less than once every five years." The preferred alternative was to implement this action at a level defined as "Operational Stewardship" that reflected a continuation of MCBH's existing level of effort in implementing its natural resources management program. MCBH will continue the same "Operational Stewardship" level of effort or as many management actions as possible during the next five years (2007-2011) as in the first five years of INRMP implementation (2002-2006).

The implementation level of effort could be reduced to the "Compliance-focused Stewardship" level (i.e., doing only those actions that ensure minimum compliance with relevant laws and regulatory agreements), if there was a sudden significant change of mission, natural resource condition, or level of fiscal/staff support to the program during the next five years. However, MCBH will not drop below this minimum compliance level without re-opening consultation on the INRMP with implementation partners (e.g., USFWS, NOAA Fisheries, and/or State DLNR), as appropriate.

5.4 OTHER CONSIDERATIONS

MCO P5090.2A requires Marine Corps installations to use the NEPA process as the vehicle through which to comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations (February 11, 1994), by evaluating the potential environmental effects of proposed actions on minority and low-income populations and implementing appropriate mechanisms for improving participation by any particularly affected minority and low-income populations. As described in Section 10.2 of the 2001 INRMP/EA, MCBH's ongoing approach is to involve diverse stakeholders – including racially, ethnically, and/or economically disenfranchised groups – in the INRMP implementation process. In addition, due to the cultural importance of MCBH lands and resources to native populations, opportunities to involve Native Hawaiians in INRMP management actions will continue to be sought and included in the on-going implementation of this INRMP on all relevant MCBH parcels.

The 2001 INRMP/EA also described how MCBH INRMP management actions are implemented with consideration for health and safety risks to children, in compliance with Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (April 21, 1997) (see Section 10.3, 2001 INRMP/EA). The EO directs Federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and ensure policies, programs, activities, and standards address these disproportionate risks appropriately. Participation of children, both as volunteers and through educational activities, is an important part of MCBH's natural resources program (see Section 9.1). MCBH will continue to maintain heightened awareness of the possibility for negative health and safety effects of children participating in such activities, and will implement appropriate measures to reduce these risks.

SECTION 6
EXISTING ENVIRONMENTAL CONDITIONS

Detailed descriptions of the existing environment of each of the five MCBH properties with significant natural resources are provided in Section 6 of the 2001 INRMP/EA. These descriptions will not be repeated here if environmental conditions remain essentially unchanged since then. This section of the updated INRMP presents a focused discussion on updated information about the existing environment at each property that is considered relevant to understanding the plan's execution schedule over the next five years. Much of this updated information results from assessments, studies, or landscape-altering events and/or projects completed during the previous INRMP reporting period (2002-2006). See Progress Reports and Tables in Appendix E2 for further details.

6.1 MARINE CORPS BASE HAWAII, KANEOHE BAY

6.1.1 LOCATION, COMMUNITY SETTING, AND LAND USES

Marine Corps Base Hawaii-Kaneohe Bay (MCBH-KB) consists of approximately 2,951 acres on Mokapu Peninsula on the windward shore of O'ahu, within the Ko'olaupoko District. MCBH-KB is bordered to the east by Kailua Bay, to the west by Kane'ohe Bay, to the north by the Pacific Ocean, and to the south by private residential housing and a sewage treatment plant. Nu'upia Ponds on the south side of the installation and Ulupa'u Head on the northeast side are officially designated Wildlife Management Areas. The two nearest communities are Kane'ohe and Kailua, located to the southwest and southeast, respectively. The population of the Kane'ohe/Kailua region (Ko'olaupoko District) is approximately 108,000 (2000 census), with Kane'ohe at 54,415 and Kailua at 51,081. See Figure 4, Appendix B: MCBH-Kaneohe Bay Site Map. For detailed information, see Section 6.1.1, 2001 INRMP/EA.

6.1.2 PHYSICAL FACTORS

For detailed information describing the physical factors of MCBH-KB including geology/ geomorphology/ soils, climate, minerals and energy resources, visual resources, water resources, air quality and noise see Section 6.1.2, 2001 INRMP/EA. New or updated information is provided in this section.

Geology/Geomorphology/Soils

Updated information on Ulupa'u Crater's erosion processes and conditions. Ulupa'u Crater is a partially eroded volcanic crater composed of highly erodible volcanic tuff that was originally formed about 1 million years ago. The eastern crater walls have crumbled away under the persistent forces of wind- and water-driven erosion. On the northern side of the Crater, sea cliffs drop almost 500 feet (152 meters) vertically to the sea. Elevations at the top ridgeline area within the Crater range from 225 to 400 feet (69 to 122 meters). A majority of the slopes along the top ridgeline area exceed 20 percent grade. The upper elevations of the northeastern ridgeline of the Crater support the red-footed booby colony in the Ulupa'u Head Wildlife Management Area (WMA) and the south/southwest portion of the Crater, just outside the "catchment" area, hosts MCBH's sanitary landfill. Within the Crater "catchment" itself, the primary land use is a weapons fire-training range. A maze of compacted unimproved access and fuel break roads and berms criss-cross the Crater interior and are subject to chronic gully erosion and rutting due to their current alignment inadvertently channeling rainwater, and otherwise aggravating the natural erosion problem.[1]

Updated information was obtained about erosion processes and conditions at the Crater during 2003-2004. At that time, an erosion assessment was conducted for the Crater Catchment and Landfill areas defined above, using a watershed approach (Project HI20013, SRGII 2004). As part of the analysis, the final report contains detailed information about watershed components including physiography (geology/geomorphology, topography, soils) for the project areas (Section 2.1, SRGII 2004). The objectives of the erosion assessment were to identify erosion hotspots areas[2]; characterize and quantify erosion rates and storm water runoff routes; and to develop concept solutions designs to reduce accelerated erosion and control storm water runoff (see COA Component Plan 7.3.1).

The set of images in Figure 8, Appendix B portrays a graphic summary of new information about Crater conditions acquired during this assessment. Details remain in the completed report (SRGII 2004). In brief, the various sub-watershed areas of the Crater were delineated, and areas of critical erosion concern and sensitivity were identified in the Crater Catchment and Landfill areas. These data describe baseline conditions that can be used as reference conditions for future studies and resulted in the identification and delineation of 'hotspots' and areas of concern within the study areas. The figures are produced from geospatial data sets generated using Geographic Information System (GIS) software. Sub-watershed areas (polygons) within the crater catchment were delineated on digital elevation model (DEM) maps provided by MCBH with GIS software (Figure 8a, Appendix B).[3] The DEM was used as the base map to calculate ground slope values (Figure 8b, Appendix B), which was used as an input for calculating relative erodibility. Erosion sensitivity was calculated and mapped using Relative Erosion Rates and Probability of Runoff, two variables derived from the GIS analysis (Figure 8f, Appendix B).

[1] Excerpt from MCBH's Scope of Work for Natural Resources Management Study to Address ECE-Mandated Erosion Compliance Problems on MCBH Lands (HI20013, cited in SRGII 2004, Appendix A).

[2] An erosion hotspot is a specific location where erosion rates exceed the natural background level causing conditions that have the potential to impair vital training ranges or to trigger compliance issues.

[3] The boundaries of the sub-watersheds were first delineated on field maps during sites visits, and later transposed onto the DEM using screen digitizing tools within the GIS program.

A summary of the primary results of the erosion assessment is provided below. Five erosion hotspots were identified within the landfill and three within the Crater Catchment (Figures 8b and 8c, Appendix B).[4] A total of seventeen erosion areas of concern were identified within the crater catchment,[5] although only three were selected for detailed analysis due to contract scope limits (Figure 8g, Appendix B).[6] The delineation of hotspots and associated concept design solutions and cost estimates has allowed MCBH to pursue detailed design and implementation phases of the project (see COA Component Plan 7.3.1). Other areas of concern are being used to prioritize future erosion assessment work, as well as to make personnel aware of immediate potential compliance concerns.

Water Resources, Wetlands and Watersheds

Updated information on MCBH-KB wetlands and wetland boundaries. Ground-based wetland boundary delineations were determined during 2001-2002 by a qualified wetland ecologist with the Army Corps of Engineers (Ching 2002), assisted by MCBH natural resources staff (INRMP Project HI20004). All suspected new or never formally delineated wetland areas as well as earlier-delineated wetland areas needing review/update on MCBH parcels were covered in the survey. A total of seven wetlands/wetland complexes at MCBH-KB were identified and mapped as jurisdictional under the criteria of the Clean Water Act administered by the US Army Corps of Engineers (see COA Component Plan 7.2.1): Hale Koa wetland; Sag Harbor wetland; Salvage Yard wetland; Nu‘upia Pond Complex (Nu‘upia ‘Ekahi Pond, Heleloa Pond, Halekou Pond, Nu‘upia ‘Elua and Nu‘upia ‘Ekolu Ponds, Nu‘upia ‘Eha Pond, and Kaluapuhi and Pa‘akai Ponds); Percolation Ditch; 3rd Marine Motor Pool, and Kaneohe Klipper Golf Course Ponds. These wetlands cover a total of 128.76 acres distributed over different major types (mangrove: 0.81 ac, pickleweed: 119.24 ac, other coastal: 2.06 ac, other fresh water: 6.65 ac), and are classified by various major uses including sediment basin/flood storage, waterbird habitat, and golf course ponds. See set of images in Figure 6, Appendix B: MCBH-Kaneohe Bay Wetlands.

Included in the final report is a detailed description in narrative format of each wetland, its relevant vegetation, hydrological, and soils characteristics for determining its jurisdictional status, as well as relevant land use history, photos, and maps (Ching 2002). Data summary sheets accompany the narratives of each wetland with additional detail in text format. Also included are the geospatial data sets in electronic format and associated metadata (summarized both in text and electronic formats). Rather than repeat this new information here, the reader is encouraged to review the original project study for details (Ching 2002) available in the MCBH Natural Resources Data Archives or at the office of the Army COE, Pacific Oceans Division, Fort Shafter, Hawaii who performed the work.

As documented in the EA completed for Project HI60834 Wetland Restoration/Percolation Ditch Replacement (Drigot 2004), this project replaces a dysfunctional, weed-choked drainage ditch with a constructed wetland, lined with native plants, in an area draining surface storm water runoff from a

[4] Selection of the Landfill hotspots for detailed analysis was based on five criteria: (1) most immediate potential to cause property damage; (2) potential to erode landfill cover material and expose buried rubbish; (3) location in a high use-level zone; (4) potential to route sediments into nearby marine waters; and (5) potential for remediation using conventional treatments.

[5] Alpha coded polygons are used to delineate areas where accelerated erosion and excessive runoff following storm events are generated. Point markers identify spots where specific surficial erosion features are located.

[6] Selection of the Crater Catchment hotspots for detailed analysis within contract scope limits was based on four criteria: (1) most immediate potential to cause property damage; (2) location in a high use-level zone; (3) proximity to the ocean; and (4) potential for remediation using conventional treatments.

combat vehicle maintenance compound. Completed in 2006, it has already reduced flooding in the adjacent military compound, implemented EPA-recommended BMPs for storm water management, and become a freshwater foraging and loafing opportunity for native and migratory waterfowl. The EA contains a useful summary of the present and historic geological, hydrologic, and drainage characteristics of the project area, land use history, as well as the flora/fauna, and cultural resources in the general project vicinity. It also references information from the concept design study upon which the project was largely based (GII and AECOS 2000). Periodic monitoring of improved wetland conditions on site as the excavated, expanded wetland matures will continue under the direction of MCBH natural resources staff in the next phase of INRMP implementation and yield continuous improvement to the database on this wetland. When the next wetland delineation update study is performed in FY08, this reconfigured wetland boundary will be recorded as part of that study (see COA Component Plans 7.2.1 and 7.2.2 for details).

New information on MCBH-KB watershed. The Mokapu Central Drainage Channel (MCDC) was constructed in the mid-20th century by incising into fill material placed on the landscape where a previous shallow wetland environment existed. INRMP Project HI20010, Restore Watershed/Repair Mokapu MCDC was designed and awarded for construction by 2006. This project is implementing a watershed-based solution to MCDC's impairment problems. It intends to relieve flood risk while restoring other watershed functions along the MCDC. This project replaces a more conventional flood control approach that would have "hardened" stream banks and further degraded the stream corridor's scenic, wildlife, and water quality values. As described in the EA completed for this project (Drigot 2005), this project will replace three acres of invasive weed-choked "fill" land along the channel with a widened, terraced and native vegetated floodplain and restored wetland "pocket" near the Enlisted Club, Temporary Lodging Facility, and Nu'upia Ponds WMA. This project will improve biofiltration of non-point source pollution; mitigate erosion effects; contain floodwaters and increase groundwater recharge; and improve water quality and related conditions conducive to a healthier aquatic habitat for native fish and birds who forage in the channel and downstream Nu'upia Ponds wetlands and Kane'ohe Bay. The resulting modified channel with its restored naturalistic conditions will also provide an enhanced shoreline for recreational use (scenic viewing and walking). The EA contains a useful compilation of information (narrative, maps, photos) on the existing and historic geological, hydrologic, and drainage characteristics of the project area, recently updated flooding inundation zones and risks along the channel (from HPE 2003a), and some of the design concepts upon which this project was based (Collins 1999 reprinted in HPE 2003a). The EA appendix contains a copy of the Nationwide Permit (NWP) #27 issued for this project by the Army COE, which is one of the first of its kind to be issued in Hawaii (Army COE staff, pers. comm.). NWP #27 is a new permit category covering Stream and Wetland Restoration Activities (67 FR 2020, Jan 15, 2002). Further information is detailed in COA Component Plan 7.3.2.

6.1.3 BIOLOGICAL FACTORS

For detailed information describing the biological factors of MCBH-KB including vegetation, fish and wildlife, species of protection concern, and species of control concern, see Section 6.1.3, 2001 INRMP/EA. Highlights of some of the new or updated biological information gathered since the 2001 INRMP/EA was published are provided in this section. See Appendix C for detailed lists of species found at MCBH-KB. A source code is included in the species lists indicating where the information about the species presence was derived and what year the information was gathered and/or reported. The reader can determine which information is newest by referring to this source code as a guide.

Vegetation

New vegetation information for Ulupa'u Crater summarized in maps of vegetation types and brush fire risk. Vegetation is a key watershed variable related to erosion regimes. The types of plants, their morphology, density and distribution all affect the rates of erosion, and surface and ground water fluxes. The erosion assessment study (INRMP Project HI20013) (SRGII 2004) used existing information on flora and field observations to develop a map of vegetation types for the study area in Ulupa'u Crater (Figure 8d, Appendix B). Since vegetation is the fuel source of wildland fires, it also has a direct influence on fire risk and spread. The vegetation map was used in combination with information about the types of ignition sources to develop a 'fire risk' map for Ulupa'u Crater (Figure 8e, Appendix B).

New/Updated descriptions of existing and recommended landscape conditions at specified areas, prohibited and prescribed plant species, and other useful guidelines for landscape decisions. The *MCBH Master Landscaping Study* (INRMP Project HI21002) was completed in 2002 (HDA 2002). As a supporting document to the INRMP, this study provided guidelines for landscaping, along with lists of approved and prohibited plant species to be used on MCBH properties that update and replace the original lists included in the 2001 INRMP/EA (see Appendix D2). Fact sheets with photos of all the plants on the preferred species list are included in an appendix of the study for further details. The study also provided narrative descriptions and photos of existing landscape conditions and recommended landscape changes at a number of management-specified locations of concern: Main Entry/H-3 Gate; Administrative Areas (Dewey Square, Headquarters Building); Officers' Housing Area (General's House, Unaccompanied Officers' Housing Area); Streetscape ("G" Street, Mokapu Blvd., 3rd Street, certain intersections); Enlisted Club; Main Recreational Field; and certain Housing areas. A number of useful appendices contain details on general care of trees and native plants; tree transplant guidelines; lawn care; proper use of fertilizers, herbicides, and mulching for weed control; avoiding damage to trees during construction; a list of certified arborists on O'ahu available for consultation; a list of native plant growers and nurseries; and a bibliography of other sources that can be consulted.

Fish and Wildlife

Updated information on marine species. The *MCBH Coral Reef Ecosystem Management Study* (CREMS) (INRMP Project HI20009) was completed in 2002 (Shafer et al. 2002). Section 4 of this report, 'Existing Ecological and Resource Management Conditions', summarizes information contained in various technical reports and environmental assessments. Field survey data included in this study but absent from the 2001 INRMP/EA is from Coles et al. 2002, a Bishop Museum Technical Report on non-indigenous marine species in Kane'ohe Bay. Three sampling stations in MCBH's south and west nearshore waters (MCBH Fuel Pier, Sag Harbor, and a reef just west of Sag Harbor) were included in this study. The species list in Appendix C has been updated to include species identified in the CREMS that were absent from the 2001 INRMP/EA. The CREMS also included a Resource Sensitivity map for Kane'ohe Bay, indicating general locations and types of sensitive marine resources.[7] Resources in MCBH waters include (1) important bryozoan habitat; (2) common habitat for the endemic squid (*Euprymna scolopes*); (3) an area of good finger coral (*Porites compressa*); (4) a portion of an area used by hammerhead sharks for pupping; (5) coral colonies with high conservation value; (6) an area dominated by finger coral which also supports a high diversity of other corals and turtle sleeping spots; (7) an area of elkhorn coral (*Pocillopora eydouxi*); and (8) an area used by turtles for grazing. This map is

[7] This map includes sensitive information that should not be advertised to the general public in order to protect the resources.

now used within MCBH Environmental Department, for example, during interagency "spill drills" and during real-time spill responses as decision support to spill response teams over issues such as how to lay out spill booms to ensure such special marine resource locations receive priority protection or clean up attention.

A follow-on INRMP project (HI20009) entitled *Inventory/Improve Management of Marine Threatened and Endangered and Invasive Species in MCBH Waters* was initiated in 2003. MCBH contracted USFWS to lead the study, which is underway as a multidisciplinary, multi-agency effort. After logistical and weather delays, the fieldwork phase of the marine resources inventory in MCBH's 500-yard seaward buffer zone was nearly completed in 2005. One more survey dive and the final report are due to be completed in 2006. Preliminary findings from data collected thus far document the rich species diversity in Mokapu's 500-yard seaward security buffer zone. Among noteworthy finds include the existence of culturally important seaweeds (*Dictyopteris australis*, known as *Limu Lipoa* in Hawaiian), and a newly-discovered native seagrass meadow (*Halophila decipiens* and *H. hawaiiana*) not previously known in Kane'ohe Bay—supporting rare sea horses (*Hippocampus* sp.) and threatened green sea turtles (*Chelonia mydas*). MCBH waters also support transiting dolphins (*Stenella longirostris*), endangered humpback whales (*Megaptera novaeangliae*) and Hawaiian monk seals (*Monachus schauinslandi*). Species lists in Appendix C have been updated based on receipt of draft results (USFWS 2006, in prep). Highlights about the marine species and conditions found in each of the eleven study stations surveyed are summarized in Figure 9, Appendix B and the accompanying text.

Updated information on invertebrate species. A FY05 MCBH-supported invertebrate survey was conducted in a small cave on the slopes of Pu'u Hawai'i Loa (Howarth and Preston 2005) in connection with an environmental assessment for a MCBH cultural resources program project (HI86749). Twenty species of arthropods were found in the cave, including a native moth living on the rock walls around the entrance that belongs to the endemic Hawaiian genus *Hyposmocoma* of the family Cosmopterygidae. Sixteen of the species were identified as alien species, and many of these are invasive pests. Of the remaining three species, two not identified below family level were represented by a single specimen each and were probably accidentally in the cave, and a coffin fly (family Phoridae) belongs to a group that includes both native and alien species**.** None of the species are candidates for ESA listing**.**

Updated information on vertebrate species—extinct and fossilized. MCBH has supported cumulative research access and scientific collection and study of fossils at Ulupa'u Crater since 1982 by Bishop and Smithsonian Institution scientists with proper access and collecting permits and following proper curation procedures for these public trust resources. Fossil shells on reef ledges along Ulupa'u Crater's coastline are of an extinct marine gastropod (*Conus kahiko*) and are 120,000 years old. A fossil bird bone deposit here is Hawaii's known oldest, dating 400,000 years before-present as verified in a 2005 publication (Hearty et al. 2005). The fossil bird bones collected were properly curated for public access at Hawaii's Bishop Museum and the Smithsonian Institution. Detailed lists of fossils collected are maintained in MCBH Natural Resources Archives as well as at the Bishop Museum and Smithsonian Institution.

Species of Protection Concern

Updated information on waterbirds. MCBH continues its on-going commitment to providing habitat for endangered species. The USFWS Waterbird Recovery Plan (2005) notes MCBH's key role as wetland managers in the Ko'olaupoko Region, where a significant component of O'ahu's remaining wetland habitat for Hawaii's four listed endangered waterbirds exists.

Updated information on regional status of Hawaiian stilt. A study entitled *Marine Corps Base Hawaii Support of Hawaiian Stilt Recovery in the Ko'olaupoko District, O'ahu* (INRMP Project HI95156) was completed in 2002 (Rauzon et al. 2002). It was funded as a contribution to the Ko'olaupoko regional effort to protect the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*).

Updated data sheets and compilations of waterbirds present at MCBH-KB. Recent efforts to standardize natural resource data collection protocols in cooperation with the State-sponsored bi-annual waterbird counts (see Figure 10a, Appendix B) have resulted in more systematic monitoring of Nu'upia Ponds and other wetland habitat areas on MCBH-KB for stilt. An Access database has been developed of Hawaiian stilt nesting and other waterbird uses of Nu'upia Ponds and other MCBH-KB wetlands in the 2006 season (see Appendix F3). This can be used as a basis for further updates.

Updated waterbird and related monitoring information. A waterbird habitat enhancement project (INRMP Project HI80726) was completed at the Klipper Golf Course Ponds (HDA 2004). The ponds were dredged, aerators were installed, and weedy plants replaced with natives along the pond shorelines in 2003. A one-year monitoring period, documenting the success of plant growth and use of the area by endangered waterbirds and other birds was completed in 2004. Detailed before/during/after photos and summaries of project site conditions and their use/adaptation by plants and birds are contained in the completed project report (HDA 2004). Ongoing monitoring by Environmental Department staff will be conducted as part of INRMP management actions to monitor MCBH wetlands, evaluate results and improve management (see COA Component Plan 7.2.4).

Updated information on migratory birds. On-going fire-suppression and erosion control projects (INRMP Project HI20007) in Ulupa'u Crater are aimed, in part, at protecting and improving the habitat of the red-footed boobies (*Sula sula rubripes*), a species managed under the Migratory Bird Treaty Act (SRGII 2006). In addition, the boundary of the Ulupa'u Head WMA, which was revised as part of the *Ulupa'u Fire Management Study* (HI21005) (BCH 2002) and finalized in the 2001 INRMP/EA, has been incorporated into the MCBH Environmental GIS and is routinely distributed as a part of base maps by the MCBH Facilities Department (see Figure 4, Appendix B).

No specific new studies of migratory birds have been carried out over the past five years, but existing records, kept over the past 25 years of systematic record-keeping at MCBH, have been reorganized and their format and accessibility improved. This information covers such phenomena as number, dates, species, and disposition of sick or injured migratory birds found and delivered to appropriate authorities under MCBH's USFWS-issued handling permit; and number, dates, and disposition of shearwaters found and treated as part of the annual "shearwater fallout" period (October – January). See Appendix F3 for details.

Species of Control Concern

Updated information on mangrove. The final EA for INRMP Project HI21004 completed in 2004 (Will Chee 2002) contains valuable information about MCBH's continued efforts to improve habitat for endangered species by removing invasive mangrove from portions of the Kane'ohe Bay shoreline of MCBH-KB, in other smaller jurisdictional wetland areas outside of Nu'upia Ponds.

Updated information on predator trapping - Improved data collection methods, formats, and records. Under continuing MCBH natural resources staff oversight, USDA Wildlife Services personnel carry out a predator trapping program at sensitive MCBH wildlife habitats and have provided detailed data on trapping results and locations. In addition, they provide technical assistance in Bird Aircraft Strike Hazard (BASH) management for the Marine Corps Air Facility (MCAF) on MCBH Kaneohe Bay and provide detailed data related to that task.[8] Continuing since FY02, MCBH expanded USDA Wildlife Services' ongoing contract for BASH management at MCBH-KB runways and nuisance animal trapping at Camp Smith, Puuloa, and MCTAB, to include trapping of predators that threaten wildlife at Nu'upia Ponds. More cost effective, labor-saving pest bait stations were installed to supplement MCBH's on-going live-trap predator control near endangered bird habitat. All of these data are maintained in the MCBH Natural Resources Archives. Their organization and formats are currently undergoing improvements (see Appendix F3).

Updated information on invasive species. The *MCBH Invasive Species Management Study* (ISMS) (INRMP Project HI20012) (Garrison et al. 2002) contains new, comprehensive descriptions of existing conditions (ecological setting, problems, past and current management activities) and recommended management actions for a range of invasive species on MCBH-KB. Analysis was conducted by management area (Nu'upia Ponds – mangroves, pickleweed, other weeds, introduced predators, tilapia and other non-native fish, upside-down jellyfish; Ulupa'u Crater – buffelgrass, kiawe, other weeds, introduced predators; Klipper Golf Course Ponds – plants, animals; Coastlines – plants, animals; and Flightlines – plants, animals, BASH). See Section 4 and Appendix F, Garrison et al. 2002 for details. In addition, Appendix H (Garrison et al. 2002) contains detailed "Invasive Species Information Pages", providing basic background information on some of the most invasive or troublesome species found on MCBH properties.

Updated information on invasive marine species. In a 2002 comprehensive survey of marine taxa at 24 stations in Kaneohe Bay (including three stations in MCBH jurisdictional waters), 116 nonindigenous or cryptogenic (i.e., origin uncertain) species were found, twelve of which are considered invasive, including: five algae, four invertebrate and three fish species (Coles et al. 2002). At the three stations sampled within MCBH jurisdictional waters (MCBH Fuel Pier, Sag Harbor and a reef location just west of Sag Harbor), thirty-five introduced animal species were identified across eleven major taxonomic groups. Introduced algae were notably absent at these sites. In total, at least fifty-six introduced species of marine or brackish fish, invertebrates and algae have been documented in MCBH waters (see Table 11-1, Shafer et al. 2002, and Appendix C). The spread of invasive alien species is a threat to marine biological diversity; recommendations to address this threat are discussed in the MCBH CREMS (Shafer et al. 2002) and the MCBH ISMS (Garrison et al. 2002).

[8] Starting in FY05, MCAF funds the contract for USDA Wildlife Services activities, while the oversight of these activities remains with the MCBH natural resources staff.

6.1.4 SOCIAL FACTORS

For detailed information describing the social factors of MCBH-KB including human community structure, cultural resources, and facilities and supporting infrastructure, see Section 6.1.4, 2001 INRMP/EA. New or updated information is provided in this section.

Facilities and Supporting Infrastructure

Updated information on new Nu'upia Ponds Recreational Run Access Trail. In 2002, after an EA and Section 7 Endangered Species Act interagency consultations were completed, a new Nu'upia Ponds Recreational Run Access Trail was opened along an outer perimeter area of the Ponds (Drigot 2002). The EA contains a useful summary of existing conditions in the ponds potentially affected by the running activities and a map of the exact route and rules of conduct to be followed along the trail so as to avoid any adverse impact on endangered waterbirds and other sensitive natural resources found in the Nu'upia Ponds WMA. The map of this route and related rules of conduct were also incorporated into the recently updated Base Regulations (BaseO P5500.15B), which is enforceable under Federal and State law and the Uniform Code of Military Justice. See COA Component Plan 7.6.2 for details.

6.2 MARINE CORPS TRAINING AREA BELLOWS

6.2.1 LOCATION AND COMMUNITY SETTING AND LAND USES

Marine Corps Training Area Bellows (MCTAB) is a 1,074 acre Marine-controlled military training area located within the 1,568 acres that comprise Bellows Air Force Station (AFS).[9] Bellows AFS/MCTAB lands are located on the windward shore of O'ahu, within the Ko'olaupoko District of eleven watersheds. These military lands are bordered by Waimanalo Bay to the east, and residential and commercial lands in the towns of Lanikai to the north, and Waimanalo to the south and west. The population of Waimanalo was approximately 9872 persons in the 2000 census. See Figure 11, Appendix B: Marine Corps Training Area Bellows and Vicinity. For detailed information, see Section 6.2.1, 2001 INRMP/EA.

6.2.2 PHYSICAL FACTORS

For detailed information describing the physical factors of MCTAB including geology/ geomorphology/ soils, climate, minerals and energy resources, visual resources, water resources, air quality and noise see Section 6.2.2, 2001 INRMP/EA. New or updated information is provided in this section.

Geology/Geomorphology/Soils

Update information on Waimanalo Stream geomorphology. As part of the *MCTAB Watershed Impairment Study* (INRMP Project HI20033), a detailed analysis of the geomorphology of the study area (Waimanalo Stream, including Waimanalo Basin) was conducted (see Section 2.3, Hood et al. 2002 for details). The analysis described, in both qualitative and quantitative terms, the current channel

[9] A land transfer in 2002 increased the acreage of MCTAB to 1,074 from 1,049 as reported in the 2001 INRMP/EA.

morphology found along Waimanalo Stream and the most probable morphology the stream channels and estuary displayed prior to anthropogenic alteration, as a basis for potential restoration design activities. Emphasis was placed on investigating how the fluvial process and tidal fluxes created the geomorphology of the basin as the driving component of a watershed assessment.

Water Resources

New information on MCTAB wetlands and wetland boundaries. Ground-based wetland delineations were conducted during 2001-2002 (Ching 2002) (INRMP Project HI20004) (see details in Section 6.1.2 above). Two wetlands at MCTAB were identified and mapped as jurisdictional under the criteria of the Clean Water Act administered by the US Army Corps of Engineers (see COA Component Plan 7.2.1): Upper Waimanalo Stream wetland and Lower Waimanalo Stream wetland. These wetlands cover a total of 8.85 acres distributed over different major types (stream: 7.85, other fresh water: 1.00 ac), and are classified by various major uses including waterbird habitat and other.[10] See Figure 14a, Appendix B: Marine Corps Training Area Bellows Wetlands.

Updated information on Waimanalo Stream hydrology. As part of the *MCTAB Watershed Impairment Study* (INRMP Project HI20033), a detailed analysis of the hydrology of the study area (Waimanalo Stream, including the sub-basins of Waimanalo watershed that contributes flow to Waimanalo, Kahawai and Inoa'ole Streams) was conducted. The analysis summarized and analyzed information on historical land use and hydrological impacts; climatic data; surface and ground water hydrology; and flood history (see Section 2.2, Hood et al. 2002 for details). This analysis provided essential information used in the concept designs for stream and wetland enhancements. Recommendations in this study led to programmed project HI0820033M Repair/Restore Waimanalo Stream, MCTAB (see COA Component Plan 7.3.2).

6.2.3 BIOLOGICAL FACTORS

For detailed information describing the biological factors of MCTAB including vegetation, fish and wildlife, species of protection concern, and species of control concern, see Section 6.2.3, 2001 INRMP/EA. Highlights of some of the new or updated biological information gathered since the 2001 INRMP/EA was published are provided in this section. See Appendix C for detailed lists of species found at MCTAB. A source code is included in the species lists indicating where the information about the species presence was derived and what year the information was gathered and/or reported. The reader can determine which information is newest by referring to this source code as a guide.

Vegetation

Updated information on MCTAB vegetation cover. A comprehensive GPS/GIS-based mapping study of vegetation cover at MCTAB (INRMP Project HI20012) was completed in 2004 (GII 2004). Although the completed survey confirmed the largely invasive nature of existing vegetation cover, it documented existence of a noteworthy stand of coastal sandalwood (*Santalum*) that may represent a significant

[10] Although MCBH commissioned the wetland delineation, upon consultation regarding real estate boundaries, it was determined that the majority (7.845 acres or 96%) of the Lower Waimanalo Stream wetland (total 8.183 acres) is on Bellows AFS property. (See Figure 14b, Appendix B).

portion of a genetically-distinct population intermediate between the coastal species *ellipticum* and the inland species *freycinianatum*. Data was collected on the spatial extent and percent cover of species including Koa haole (*Leucaena leucephala*), Guinea grass (*Panicum maximum*), Christmasberry (*Schinus terebinthus*), Kiawe (*Prosopis pallida*), and California grass (*Brachiaria mutica*). Point data was collected on the locations of Fountain grass (*Pennisetum setaceum*) infestations. By analyzing areas with high percentage cover of more than one high fire danger species (e.g., Koa haole and Guinea grass), maps of high fire danger were developed. Follow-on studies are in progress (HI20012) to develop vegetation management plans for control of invasive species, erosion, and brushfires (SWCA 2006, in prep.). See set of images in Figure 17, Appendix B.

Fish and Wildlife

Updated information on marine species. The *MCBH Coral Reef Ecosystem Management Study* (INRMP Project HI20009) was completed in 2002 (Shafer et al. 2002). Section 4 of this report, 'Existing Ecological and Resource Management Conditions', summarizes information scattered in various technical reports and environmental assessments. There is limited information specifically about marine resources at MCTAB or on the transit route from Fort Hase Beach, MCBH-KB to Bellows Beach, MCTAB.

Species of Protection Concern

Updated information on regional status of Hawaiian stilt. A study entitled *Marine Corps Base Hawaii Support of Hawaiian Stilt Recovery in the Ko'olaupoko District, O'ahu* (INRMP Project HI95156) was completed in 2002 (Rauzon et al. 2002). It was funded as a contribution to the Ko'olaupoko regional effort to protect the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*). Wetlands at MCTAB are considered 'secondary' wetlands within the Ko'olaupoko region, and have the potential to support limited populations of native endangered waterbirds, including stilt, for roosting and foraging.

Species of Control Concern

Updated information on invasive species. The *MCBH Invasive Species Management Study* (ISMS) (INRMP Project HI20012) (Garrison et al. 2002) contains a comprehensive description of existing conditions (ecological setting, problems, past and current management activities) and recommended management actions for the range of invasive species on MCTAB. Analysis was conducted by major vegetation type (Coastal Strand; Ironwood Forests; Koa haole/Christmasberry Shrubland; Koa haole Hilly Shrubland; Mixed Introduced Forest; Wetlands), in addition to invasive animals. See Section 5 and Appendix F, Garrison et al. 2002 for details. In addition, Appendix H (Garrison et al. 2002) contains detailed "Invasive Species Information Pages", providing basic background information on some of the most invasive or troublesome species found on MCBH properties, such as fountain grass (*Pennisetum setaceum*).

6.2.4 SOCIAL FACTORS

For detailed information describing the social factors of MCTAB including human community structure, cultural resources, and facilities and supporting infrastructure, see Section 6.2.4, 2001 INRMP/EA.

6.3 WAIKANE VALLEY IMPACT AREA

6.3.1 LOCATION, COMMUNITY SETTING, AND LAND USES

The 187 acre parcel of land owned by MCBH in Waikane Valley is part of the former Waikane Valley Training Area. The Waikane Valley Training Area (excluding the MCBH parcel) is on the current list of Formerly Used Defense Site funding list for ordnance clean-up (Tuggle and Wilcox 1998). Waikane Valley is the northernmost valley in the Koʻolaupoko District of windward Oʻahu. The site is located about 14 miles north of MCBH-KB. The property is bounded to the north, south and west by undeveloped forest lands owned by two corporations (Kualoa Ranch and SMF Enterprises). The City and County of Honolulu owns the land to the southeast, which is now designated as the Waikane Nature Preserve. See Figure 18, Appendix B: MCBH-Waikane Valley Impact Area and Vicinity. For detailed information, see Section 6.3.1, 2001 INRMP/EA.

As indicated in Section 4.3.3, the Waikane Valley Impact Area is now "closed" and efforts are underway to clean up the range under DoD's MMRP. While that process is underway, and given the presence of ordnance and lack of active military use, the only planned natural resources management activities include enforcement (keeping people safe by keeping them out) and monitoring of natural resources conditions (See COA Component Plan 7.1.3 for further details).

6.3.2 PHYSICAL FACTORS

For detailed information describing the physical factors of Waikane Valley Training Area including geology/ geomorphology/ soils, climate, minerals and energy resources, visual resources, water resources, air quality and noise see Section 6.3.2, 2001 INRMP/EA. New or updated information is provided in this section.

Water Resources

Updated information on wetlands. A survey of the property as part of the HI20004 Wetland Delineation Project did not identify any jurisdictional wetlands on the property (Ching 2002).

Updated information on water quality in Waikane Stream. As part of a natural resources investigation undertaken for the Waikane Valley Training Area, existing water quality of Waikane Stream was characterized (through field measurements) and compared to previous water quality efforts (Guinther et al. 2003). Samples were collected at four locations, from above to below the project area. As detailed in the report, for the parameters sampled (temperature, pH, conductivity, dissolved oxygen, turbidity, total suspended solids, ammonia, nitrates, total nitrogen, and total phosphorus), the values are in within ranges indicating good water quality and show patterns typical of streams.

6.3.3 BIOLOGICAL FACTORS

For detailed information describing the biological factors of Waikane Valley Training Area including vegetation, fish and wildlife, species of protection concern, and species of control concern, see Section 6.3.3, 2001 INRMP/EA. Highlights of some of the new or updated biological information gathered since the 2001 INRMP/EA was published are provided in this section. See Appendix C for detailed lists of species found at Waikane Valley Impact Area. A source code is included in the species lists indicating where the information about the species presence was derived and what year the information was gathered and/or reported. The reader can determine which information is newest by referring to this source code as a guide.

Vegetation

Updated botanical survey for Waikane Valley Impact Area. As part of a natural resources investigation undertaken for the MCBH portion of Waikane Training Area, a botanical survey was conducted (Guinther et al. 2003).[11] The survey recorded a total of 104 vascular plant species (13 ferns and fern allies, 91 flowering plants), of which 17 are native species (five are endemic and 12 are indigenous) and 87 are alien (ten Polynesian introductions and 77 modern introductions). All of the native species are fairly common in Hawaii and none are on any (Federal/State) lists of rare, threatened or endangered plants. The report suggests that one native species included in the 2001 INRMP/EA species list was mis-identified (*Wikstroemia uva-ursi*), and is actually *Wikstroemia oahuensis*, which was found during the current survey. Species lists in Appendix C have been updated to include the results of this survey.

In addition to identifying species, the report characterizes plant communities based upon structure and the dominant species present. Managed Land Vegetation and Secondary Forest cover most of the flat to sloping areas south of the hills on the northern side of the parcel and are completely dominated by alien species. O'hia Scrub and Koa/Uluhe Woodland occur on some of the ridges that extend up to the northern ridge line of the parcel and are characterized primarily by native species, though they also contain alien species. The report includes additional details about species found in each community.

Fish and Wildlife

As part of a natural resources investigation undertaken for the MCBH portion of Waikane Valley Training Area, a series of faunal surveys were conducted, including invertebrates[12], mammals (incidental observations), birds[13], and aquatic biota[14] (Guinther et al. 2003). Species lists in Appendix C have been updated to include the results of these surveys.

[11] A 'walk through' survey method was employed in which a series of informal transects were carried out across the area. Areas most likely to contain native species (e.g., less-disturbed areas and higher elevations) were given more emphasis than disturbed areas.
[12] Included visual sampling during the day and night sampling. Efforts were focused on the most mauka ridge within the parcel, in areas with a higher percentage of native vegetation.
[13] Nine count stations were established across the parcel and eight minute unlimited distance variable circular plot counts were made at each station during the early morning.
[14] Incidental observations collected by walking the full length of the stream, making visual observations, and sampling selected features with fine-mesh hand nets.

Updated information on invertebrates. The survey observed 30 different invertebrate species, some only identifiable to the genus level. An associated discussion in the report text describes the interdependent relationship between plant and invertebrate populations, especially, that *Acacia koa* has more endemic insects attached or dependent on it than any other tree (Swezey 1954 in Guinther et al. 2003). The areas of native vegetation within the parcel also likely support higher populations of native invertebrates.

Updated information on mammals. As per other previous observations in the parcel, signs of introduced mammalian species including domestic dog (*Canis familiaris*), small Indian mongoose (*Herpestes auropunctatus*), cat (*Felis catus*), and pig (*Sus scrofa*) were found during the course of the survey (Guinther et al. 2003).

Updated information on birds. All 369 birds, representing 15 species, recorded during the surveys were alien species (Guinther et al. 2003). Avian diversity was relatively low, and the Japanese white-eye (*Zosterops japonicus*) accounted for 33% of the total number of birds observed.

Updated information on aquatic biota. The reconnaissance survey of Waikane Stream for aquatic biota did not identify any aquatic macrofauna that were previously unknown from the stream system (Guinther et al. 2003). Adults of the native *ʻoʻopu nakea* (goby, *Awaous guamensis*) were observed in low numbers. The report also includes a summary table of aquatic animals found by previous surveys within Waikane Stream and estuary.

Species of Protection Concern

Updated information on critical habitat. Critical habitat for the federally endangered Oʻahu ʻelepaio (*Chasiempis sandwichensis*) (listed by the USFWS in May 2000) was designated in December 2001 (Federal Register Vol. 66, No. 237, p. 63752). Although critical habitat was not designated within the boundary of the Waikane Valley Impact Area, it does include land along the property's northwest border (see Figure 18, Appendix B). To date, there are no documented sightings of ʻelepaio in the Waikane Valley Impact Area.

Species of Control Concern

Updated information on invasive species. The *MCBH Invasive Species Management Study* (ISMS) (INRMP Project HI20012) (Garrison et al. 2002) contains a comprehensive description of existing conditions (ecological setting, problems, past and current management activities) and recommended management actions for the range of invasive species at Waikane Valley Impact Area. Analysis was divided into invasive plants and animals. See Section 8 and Appendix F, Garrison et al. 2002 for details. In addition, Appendix H (Garrison et al. 2002) contains detailed "Invasive Species Information Pages", providing basic background information on some of the most invasive or troublesome species found on MCBH properties.

6.3.4 SOCIAL FACTORS

For detailed information describing the social factors of Waikane Valley Training Area including human community structure, cultural resources, and facilities and supporting infrastructure, see Section 6.3.4, 2001 INRMP/EA.

6.4 MARINE CORPS BASE HAWAII, CAMP H.M. SMITH

6.4.1 LOCATION, COMMUNITY SETTING, AND LAND USES

MCBH-CS covers 220 acres in the leeward O‘ahu uplands. The nearest town is ‘Aiea which had a population of 9019 persons in the 2000 census. MCBH-CS is bounded to the northeast by the undevelopable slopes of the Ko‘olau Range, and is contiguous with a forested State recreation area to the south and east. Keaiwa State Park is contiguous with MCBH-CS along the northern boundary. MCBH-CS is bordered to the northwest and southwest by residential and commercial areas, including Aiea Homesteads and Halawa Heights. Halawa Valley is located south of MCBH-CS, and is highly industrialized. See Figure 20, Appendix B: MCBH-Camp H.M. Smith and Vicinity. For detailed information, see Section 6.4.1, 2001 INRMP/EA.

6.4.2 PHYSICAL FACTORS

For detailed information describing the physical factors of MCBH-CS including geology/ geomorphology/ soils, climate, minerals and energy resources, visual resources, water resources, air quality and noise see Section 6.4.2, 2001 INRMP/EA. New or updated information is provided in this section.

Water Resources

Updated information on wetlands. A survey of the property as part of the HI20004 Wetland Delineation Project did not identify any jurisdictional wetlands on the property (Ching 2002).

6.4.3 BIOLOGICAL FACTORS

For detailed information describing the biological factors of MCBH-CS including vegetation, fish and wildlife, species of protection concern, and species of control concern, see Section 6.4.3, 2001 INRMP/EA. Highlights of some of the new or updated biological information gathered since the 2001 INRMP/EA was published are provided in this section. See Appendix C for detailed lists of species found at MCBH-CS. A source code is included in the species lists indicating where the information about the species presence was derived and what year the information was gathered and/or reported. The reader can determine which information is newest by referring to this source code as a guide.

Vegetation

New/Updated descriptions of existing and recommended landscape conditions at specified areas, prohibited and prescribed plant species, and other useful guidelines for landscape decisions. The *MCBH Master Landscaping Study* was completed in 2002 (INRMP Project HI21002) (HDA 2002). As a supporting document to the INRMP, this study provides guidelines for landscaping, along with lists of approved and prohibited plant species to be used on MCBH properties (see Section 6.1.3 above and Appendix D2).

Species of Control Concern

Updated information on invasive species. The *MCBH Invasive Species Management Study* (ISMS) (INRMP Project HI20012) (Garrison et al. 2002) contains a comprehensive description of existing conditions (ecological setting, problems, past and current management activities) and recommended management actions for the range of invasive species on MCBH-CS. Analysis was conducted by general area type (Administrative, Forested, Manana Housing), in addition to invasive animals. See Section 6 and Appendix F, Garrison et al. 2002 for details. In addition, Appendix H (Garrison et al. 2002) contains detailed "Invasive Species Information Pages", providing basic background information on some of the most invasive or troublesome species found on MCBH properties.

MCBH natural resources staff oversee USDA Wildlife Services' nuisance bird/animal damage control activities at MCBH-CS. Continuing since FY02, USDA Wildlife Services' has an ongoing contract for nuisance animal trapping at MCBH-CS.

6.4.4 Social Factors

For detailed information describing the social factors of MCBH-CS including human community structure, cultural resources, and facilities and supporting infrastructure, see Section 6.4.4, 2001 INRMP/EA.

6.5 PUULOA TRAINING FACILITY

6.5.1 Location, Community Setting, and Land Uses

Puuloa Training Facility is a 137 acre facility, located on the leeward O'ahu coast near Pearl Harbor at the eastern edge of the 'Ewa Plain. It is an active training facility used for small arms practice. The facility is located in an urbanized area, just east of the town of 'Ewa Beach, which had a population of 14,650 persons in the 2000 census. The northern border of the Puuloa Training Facility adjoins a Federal Aviation Administration Transmitter Facility site that is relatively undeveloped. Lands to the east of the facility are primarily owned by Public Works Center Pearl Harbor and include Iroquois Point Naval Housing. To the east of the housing area, the Iroquois Point Elementary School is located on lands owned by the City and County of Honolulu. The western border of the Training Facility adjoins private property, portions of which have been developed into single-family housing. Directly adjacent to the western edge of this residential area (approximately 300 feet from Puuloa Training Facility) is 'Ewa Beach

park, a public recreation area. See Figure 23, Appendix B: MCBH-Puuloa Training Facility and Vicinity. For detailed information, see Section 6.5.1, 2001 INRMP/EA.

6.5.2 PHYSICAL FACTORS

For detailed information describing the physical factors of Puuloa Training Facility including geology/ geomorphology/ soils, climate, minerals and energy resources, visual resources, water resources, air quality and noise see Section 6.5.2, 2001 INRMP/EA. New or updated information is provided in this section.

Geology/Geomorphology/Soils

Updated information on shoreline erosion/stabilization. A shoreline stabilization project (INRMP Project HI10007) was completed in 2004 as a mitigation action resulting from alterations to a range berm. The original project involved construction of an earthen berm and vertical berm extensions in a location adjacent to the sandy beach at Puuloa Training Facility without application for a Coastal Zone Management (CZM) consistency determination. In addition, the project failed to anticipate shoreline erosion forces, beach replenishment processes, and their effects. Post construction, MCBH coordinated a required shoreline certification with the State and completed the necessary CZM consistency determination to acquire a permit for emergency erosion mitigation. The mitigation involved design modifications to the range impact berm to improve access to its steep-sides for future repairs. It also established native vegetation groundcover in order to stabilize erosion of the adjacent shoreline. The basis of design, plans, and specifications followed to implement this project contain further details and are held in the MCBH Natural Resources Archives (HPE 2003b).

6.5.3 BIOLOGICAL FACTORS

For detailed information describing the biological factors of Puuloa Training Facility including vegetation, fish and wildlife, species of protection concern, and species of control concern, see Section 6.5.3, 2001 INRMP/EA. Highlights of some of the new or updated biological information gathered since the 2001 INRMP/EA was published are provided in this section. See Appendix C for detailed lists of species found at Puuloa Training Facility. A source code is included in the species lists indicating where the information about the species presence was derived and what year the information was gathered and/or reported. The reader can determine which information is newest by referring to this source code as a guide.

Vegetation

New/Updated descriptions of existing and recommended landscape conditions at specified areas, prohibited and prescribed plant species, and other useful guidelines for landscape decisions. The *MCBH Master Landscaping Study* was completed in 2002 (INRMP Project HI21002) (HDA 2002). As a supporting document to the INRMP, this study provides guidelines for landscaping, along with lists of approved and prohibited plant species to be used on MCBH properties (see Section 6.1.3 and Appendix D2).

As indicated in Section 6.5.2, native vegetation was planted as part of HI10007, a shoreline stabilization project at Puuloa Training Facility. (See HPE 2003b for planting plan).

Species of Control Concern

Updated information on invasive species. The *MCBH Invasive Species Management Study* (ISMS) (INRMP Project HI20012) (Garrison et al. 2002) contains a comprehensive description of existing conditions (ecological setting, problems, past and current management activities) and recommended management actions for the range of invasive species at Puuloa Training Facility. Analysis was conducted by general area type (Inactive 1000m Firing Range, Coastal Area), in addition to invasive animals. See Section 7 and Appendix F, Garrison et al. 2002 for details. In addition, Appendix H (Garrison et al. 2002) contains detailed "Invasive Species Information Pages", providing basic background information on some of the most invasive or troublesome species found on MCBH properties.

MCBH natural resources staff oversee USDA Wildlife Services' nuisance bird/animal damage control activities at Puuloa Training Facility. Continuing since FY02, USDA Wildlife Services' has an ongoing contract for nuisance animal trapping at Puuloa Training Facility. Trapping and control records are maintained in the MCBH Natural Resources Archives.

6.5.4 SOCIAL FACTORS

For detailed information describing the social factors of Puuloa Training Facility including human community structure, cultural resources, and facilities and supporting infrastructure, see Section 6.5.4, 2001 INRMP/EA.

SECTION 7
COURSE OF ACTION COMPONENTS

7.0 COURSE OF ACTION ORGANIZATIONAL FRAMEWORK

7.0.1 SEVEN COURSE OF ACTION (COA) COMPONENT PLANS

This updated MCBH INRMP for 2007-2011 is organized the same as the 2001 INRMP/EA (2002-2006) in so far as describing INRMP implementation. Thus, MCBH continues to follow an ecosystem management approach involving execution of a suite of management actions along seven different Course of Action (COA) areas of concern: Fish and Wildlife; Wetland; Watershed; Coastal and Marine Resources; Grounds Maintenance and Landscape; Quality of Life, Outdoor Recreation, and Outreach; and Resources Information Management.[1] These categories were carefully constructed during development of the 2001 INRMP/EA to represent the full array of natural resources found on MCBH properties.

7.0.2 ORGANIZATION OF EACH COA COMPONENT PLAN

As in the 2001 INRMP/EA, each of the seven COA component plans that follow (e.g., Sections 7.1 – 7.7) are organized to contain: an introductory summary of relevant policy and other pertinent information about that COA and an annotated list of management actions linked to relevant goals and objectives. The set of goals and objectives across these seven COAs is basically the same as in the 2001 INRMP/EA and is listed in its entirety in Appendix E1. In reviewing the description of management actions listed in each COA component plan, the reader is encouraged to consult the annual progress reports summarizing how recurring management actions were addressed during the first five year INRMP/EA (See Section 7.0.6, tables referenced therein, and Appendix E2). This will give the reader a good idea of how those actions will continue to be carried out over the next five years. For discrete management actions that are continued from the first five year plan into the next (e.g., those having been just started in FY05 or FY06, having evolved from a previous phase of the same effort, or having been the "offspring" of a recommendation in a previous study), a brief history of that management action will be provided, giving the reader the overall context for the currently listed project. However, details of that "history" will reside in the 2001 INRMP/EA and/or the annual INRMP implementation progress reports (see Appendix E2).

[1] The only difference is the addition of the word "outreach" in the title of the Quality of Life, Outdoor Recreation, and Outreach COA component to emphasize that public involvement is an important part of this component.

The management actions bulletized in each of the seven COA component plans under their relevant goals and objectives are without numbering since their occurrence and relative priority in any given year during the five year time-frame of INRMP implementation can vary. Each management action listed may or may not be implemented in a given year or location within the various MCBH parcels depending on a variety of factors (see Table E3-2, Appendix E3 for a list of management actions and their planned implementation schedule). For example, not all MCBH parcels contain wetlands, so the wetland goals and objectives will not always pertain. In addition, the level of management effort being undertaken at various times and locations can differ depending on a variety of factors (e.g., Waikane Valley is an impact area where extremely limited levels of active management can take place safely; monitoring of the status of the natural resources is an appropriate effort, but any deliberate disturbances such as habitat restoration activities are not relevant due to the parcel being managed under the Military Munitions Response Program (see Section 4.3.3).

7.0.3 IMPLEMENTATION LEVEL OF EFFORT

The level of management efforts undertaken to implement INRMP management actions across MCBH parcels are contained within three levels of management effort: Operational Stewardship, Compliance-focused Stewardship, or Optimal Stewardship. These are the same three alternative levels of effort considered for implementing MCBH INRMP management actions in the seven COA areas that were designated in the original 2001 INRMP/EA. They define the minimum/maximum range of management efforts possible within the INRMP implementation framework while still adhering to relevant laws, regulations, and directives. See Appendix E3 COA Tables for further detail.

MCBH is committed to continuing the same "Operational Stewardship" level of effort during the next five years (2007-2011) as in the first five years of INRMP implementation (2002-2006). Should there be a sudden significant change of mission, natural resource condition, or level of fiscal/staff support to the program during the next five years, the level of effort could be reduced to the "Compliance-focused Stewardship" level—i.e., doing only those actions that ensure minimum compliance with relevant laws and regulatory agreements. MCBH is also committed to performing an "Optimal Level of Stewardship" management effort whenever the opportunity arises. For example, if an outside, unexpected source of funding or partner support facilitates MCBH conducting a "nice to have" management action in the "Optimal" category – such as installing additional environmental displays or interpretive brochures – MCBH would strive to accomplish this management action.

7.0.4 TYPES OF MANAGEMENT ACTIONS

In addition to several levels of effort pursued for various management actions listed in the COA component plans, there are two main types of management actions listed therein.

(1) Management Actions with Specific Project Numbers and Titles: These projects often have several phases of execution: define the problem in a preliminary study; prepare a concept design or implementation plan to address the problem; develop detailed design and specifications to fix the problem; award a contract to implement the project design and specifications; maintain the finished project; assess and monitor project results; and modify or replace the project. The various phases of a particular project can last from five to ten or more

years, depending on the nature of the project, funds available, amount of advance site preparation needed, regulatory permits required, etc. Examples are HI20004 Wetland Delineation/ Mapping/ Review/ Update and HI0920013M Install Erosion BMPs: Crater Slope and Shoreline. Both of these projects involve performance of a specific study or survey of a structure or geographic features (e.g., inventory and determine jurisdictional boundaries of MCBH wetlands; or assess status of erosion on Ulupa'u Crater) as the first phase. Then, these projects may or may not continue in future years and phases. In the project HI20004 example, MCBH completed an inventory of its present wetlands under US Army Corps of Engineers jurisdictional criteria in 2002, and has programmed a review and update of that wetland inventory five years later (FY08), as required by regulatory guidance. In the erosion survey example, project HI0920013M started with an erosion assessment/concept design phase for developing design solutions. It continues with a design phase for installation of erosion remedies, followed by installation of those remedies. These projects with their various phases are programmed for execution over a five year time frame (see Appendix E3 for details).

(2) **Non-numbered Management Actions:** Other management actions do not have a specific project number, such as: "Review and update fishing policies, practices, and access protocols to reflect latest laws, best science, and use constraints," and "Continue to participate in state-coordinated semi-annual waterbird counts." These actions are usually conducted by in-house MCBH staff, in coordination with other military units, partner agencies, and/or volunteers. The actions may lead to specific projects and data-gathering investigations that do acquire assigned project numbers, but only after preliminary assessment of needs by in-house staff in collaboration with various stakeholders affected.

(3) **Overall Program Management Actions:** Another type of INRMP management action is programmatic and transcends all seven COA areas and relates to sustainment of adequate levels of qualified staff and supplies/material resources to implement INRMP management actions detailed in the COA component plans. Details on the labor/materials investments in overall INRMP program management over the five-year implementation period of the INRMP are contained in Section 4 and Appendix E3 (Table E3-1) and E4.

7.0.5 Overview of INRMP Implementation Progress Since 2001

November 2001 marks the beginning of MCBH INRMP implementation, when the INRMP was published as a combined plan and environmental assessment – to guide MCBH's ecosystem-based approach to natural resource management, while supporting quality of life and "no net loss" in training options. The plan was reviewed and concurred with by in-house stakeholders and the INRMP/Finding of No Significant Impact was signed off by the Base commander and distributed for public review and comment. Required regulator concurrence was received from USFWS, NOAA Fisheries, and Hawaii DLNR as documented in Appendix H of the 2001 INRMP/EA. Documentation of the final concurrence and public notice process for INRMP/EA and Finding of No Significant Impact (FNSI) completion/distribution is contained in Appendix G3 of this INRMP Update, along with a copy of the signed FNSI (still in effect). An $8-million budget for the first five years of INRMP implementation supported completion of over 300 discrete management actions across five years of plan implementation (2002-2006) at the "Operational Stewardship" level of management effort.

In the five years since MCBH's INRMP/EA was completed, steady progress has been made to implement the plan. As of November 2006, most of the management actions planned in the 2001 INRMP/EA have been addressed, and all "must fund" discrete management projects (see Table 7.1, pg 7-3 of the 2001 INRMP/EA) are either completed, or in-progress. Some actions were implemented ahead of schedule and some opportunities for optimal level of effort on management actions that were unforeseen in 2001 were exploited (e.g., due to regional partnering and conferencing initiatives). Some less critical management actions were deferred in order to address emergent priorities. Emergent priorities (e.g., increased tempo of military training since "9-11") and changing natural resource conditions (e.g., prolonged drought) caused shifts in project implementation sequence. Despite these minor variations, MCBH's overall INRMP has thus far been implemented on time and within budget.

Details of steady progress summarized above are recounted in the annual progress reports sent to cooperative partners, as required, during the past five years, and are reprinted in Appendix E2. As part of these annual progress reports, two tables were presented as Attachments A and B. The Attachment A table showed progress in accomplishing the discrete "must fund" management actions listed in Table 7.1 of the 2001 INRMP/EA. With each yearly submission of a progress report, this table was modified to reflect whether each original listed project shifted from "active" to "completed" status or was superseded by a project that surfaced due to either shifting mission priorities or change in natural resources conditions. The Attachment B table in each progress report was a comprehensive listing of all the INRMP management actions (both discrete projects and administrative-type actions) that were actually accomplished that year as compared to those that were planned for that year, as a measure of execution rate (i.e., if they were planned for accomplishment in 2002, were they actually accomplished that target year? Or were they accomplished in advance or arrears of their original programmed target time of execution? Or were they removed from the list of programmed projects altogether for various reasons?). These tables also documented how the actions were linked to specific INRMP goals and objectives as stated in the 2001 INRMP/EA. By reviewing the text of the annual progress reports and the accompanying tables (see Appendix E2), the reader can see how steady progress has been made at an 85% execution rate to implement planned actions at the "Operational" level of effort.

Since some of the management actions were either delayed in their start date or rate of execution during the first five years of 2001 INRMP/EA implementation, some of the original "must fund" projects scheduled for completion by 2006 continue to appear in the updated table of INRMP management actions covering the next five years (2007-2011) (see Appendix E3 showing Active and Programmed INRMP Projects). Only one of the original discrete projects in the 2001 list has been dropped from further consideration during the next five years and has been postponed indefinitely (HI32168 Design/Construct Pa'akai Pond/Beach Restoration).[2]

[2] A "post 9-11" world and increased tempo of military support requirements has necessitated an increased emphasis on focusing limited funds and staff efforts on sustaining recent environmental gains and completing projects that are already in an early phase of execution rather than undertaking any major additional environmental restoration projects that cannot be adequately supported over the next five years. These recent gains to be sustained include, for example, HI21004 Endangered Species Habitat Enhancement/Mangrove Removal; HI80726, Golf Course Ponds/Endangered Waterbird Habitat enhancements; HI60834 Wetland Restoration/Percolation Ditch Replacement; HI20010 Watershed Repair/Restore, MCDC; and HI20033 Construct MCTAB Watershed Impairment Solution. See Appendices E2 and E3 for further details.

7.0.6 MEASURING SUCCESSFUL INRMP IMPLEMENTATION

Following DoD and USMC directives (HQ USMC 2006), and as reflected in the component criteria of the annual INRMP progress reports submitted for regulator review (see Appendix E2), MCBH has met various criteria established for measuring INRMP implementation progress. Thus, MCBH INRMP progress reports have systematically addressed the following criteria for each reporting year: (1) sufficiency in numbers/professional qualifications of INRMP staff available to perform required INRMP actions; (2) adaptability to emergent management needs as mission priorities or natural resources conditions changed; (3) extent to which "must fund" projects identified in the INRMP were adequately budgeted for and being implemented "on schedule"; (4) extent to which required Federal, State, and installation coordination has occurred; and (5) extent of progress made on implementing INRMP management actions was clearly linked to established INRMP goals and objectives.

Systematic tracking of INRMP implementation progress in this manner has contributed to MCBH's being the first USMC installation to successfully meet EPA's requirement that Federal agencies implement principles-based environmental management systems (EMS) with performance measures for tracking progress. In addition, the USFWS has favorably cited MCBH success in this regard. In 2005, the USFWS's Pacific Islands Fish and Wildlife Office nominated MCBH for the Service's 2004 Military Installation Conservation Partner Award, citing that MCBH "completed, funded, and implemented its INRMP on time, including timely review and submission to the Service for Section 7 (Endangered Species Act) consultation and National Environmental Policy Act (NEPA) compliance." In May 2005, MCBH was honored as one of the top finalists for this nationwide US FWS military partner award. In addition, the Service's Pacific Islands Office noted "thoughtful and creative approaches that have been built into INRMP project planning and execution at MCBH…resulting in tangible benefits to Federal trust resources."

It should be noted by reviewers that the need for improving measurement of project success has been included among management objectives in various COA components (see summary list of goals and objectives in Appendix E1, showing multiple references to the need for development and application of performance measures for evaluating success of various projects). For several projects planned in the five-year time frame of this updated INRMP, for example, a post-construction monitoring phase has been built in—i.e., five years after a given project is completed, an assessment of environmental conditions in the project area will be performed to help answer the question: Did we really accomplish what we said we would?

There is an emergent requirement to use additional INRMP evaluation methods per recently-updated DoD and USMC guidance manuals and correspondence received (HQ USMC 2006). Thus, per Commandant of the Marine Corps Letter to USMC installation commanders of June 5, 2006, a new Natural Resources Program Metrics is in effect starting December 2006, as part of annual reporting procedures for FY06. As explained therein, a "Natural Resources Metrics Builder" has been developed "to provide a standard method for collecting and reporting information on effectiveness of Natural Resources programs." Seven focus areas are included in the Metrics Builder, the first six of which are to be scored in partnership with USFWS and State wildlife agency representatives (e.g., DLNR in Hawai'i). The seventh focus area is to be scored by the installation operations office (at MCBH, this is the G-3 military operations office). The focus areas are:

(1) Integrated Natural Resources Management Plan (INRMP) Implementation;

(2) Listed Species and Critical Habitat;

(3) Partnership Effectiveness;

(4) Fish and Wildlife Management and Public Use;

(5) Team Adequacy;

(6) Ecosystem Integrity; and

(7) INRMP Impact on the Installation Mission.

The results of the first year's evaluation using this new metric will be reported as part of the annual INRMP progress report submitted in 2007. In sum, the annual INRMP evaluation requirements/progress reports starting at the end of CY06, will include the results of the Natural Resources Program Metrics application, as well as the other areas of evaluation already being covered. Thus, as stated in the USMC INRMP Handbook (HQ USMC 2006):

Annual reviews shall verify that:

- Current information on all conservation metrics is available.
- All "must fund" projects and activities have been budgeted for and implementation is on schedule.
- All required trained natural resources positions are filled or are in the process of being filled.
- Projects and activities for the upcoming year have been identified and included in the INRMP. An updated project list does not necessitate revising the INRMP.
- All required coordinations have occurred.
- All significant changes to the installation's mission requirements or its natural resources have been identified.

7.1 FISH AND WILDLIFE MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Fish and wildlife management has been the core component of MCBH's natural resource conservation activities since at least 1966 when an "Agreement for the Conservation and Development of Fish and Wildlife" was completed December 6, 1966 under authority of the Sikes Act of 1960 (see Appendix A4). At that time, management was concentrated on Mokapu Peninsula, as that was the only property under Marine Corps jurisdiction (i.e., the former Marine Corps Air Station, Kaneohe Bay (MCAS-KB)), and it contained significant concentrations of fish and wildlife resources. For thirty years starting with the 1970 publication of the first wildlife management plan for MCAS-KB by the USFWS (then called US Bureau of Sports Fisheries and Wildlife), fish and wildlife management efforts were focused at two designated Wildlife Management Areas (WMAs) on Mokapu Peninsula: 517-acre Nu'upia Ponds WMA and 25-acre Ulupa'u Head WMA.

Since the 1994 "stand up" of Marine Corps Base Hawaii to replace MCAS-KB, and the expansion of geographic areas within USMC/MCBH jurisdiction, there has been a concerted effort to also improve management of fish and wildlife in areas outside the two WMAs. Factors influencing this intensified effort include an increase in MCBH environmental staff and budget over that time frame, and a shift in DoD policy to support military installations incorporating ecosystem management principles and guidelines into their natural resource management programs (e.g., DoD Instruction 4715.3, see Appendix A1).

Refer to COA Component Plan 7.1 of the 2001 INRMP/EA for further details on the history of fish and wildlife management on Mokapu Peninsula. In summary, since the early 1990s, and throughout the implementation period of the first five-year INRMP, fish and wildlife efforts have continued in the two WMAs on Mokapu Peninsula, and have expanded to cover other terrestrial and aquatic areas on the peninsula and at MCTAB; as well as the marine environment in the 500-yard seaward security buffer zone around Mokapu Peninsula. Fish and wildlife activities at MCBH's leeward parcels (e.g., Camp H.M. Smith, Puuloa, and Manana) have focused primarily on nuisance/invasive animal and plant species control. At the windward-located Waikane Valley Impact Area parcel, fish and wildlife management activities have been limited to baseline environmental monitoring and conservation law enforcement while awaiting completion of clean up assessments and plans for this ordnance-contaminated property. As detailed in Section 3 and Appendix A1, MCBH continues to systematically apply an ecosystem-based management approach to wildlife and other natural resources management activities at all MCBH parcels.

Goal 7.1: Fish and Wildlife Management

Contribute to maintenance of healthy regional fish and wildlife populations by managing protected species and habitats that currently exist within MCBH lands/waters/air space, consistent with natural resources laws, military directives, interagency consultations, management programs, and permits.

The set of Objectives, Approaches, and Projects/Actions described below is designed to help reach Goal 7.1. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.1.1: Implement MCBH-KB's Fish and Wildlife Management Program at the two Wildlife Management Areas (WMAs) on Mokapu Peninsula.[1]

This section provides a consolidated list of continuing management actions in the fish and wildlife management program at MCBH-KB. These management actions are subdivided into four element categories: (1) Nu'upia Ponds WMA Species/Habitat Enhancement (NPWMA/SHA), (2) Nu'upia Ponds WMA Public Use (NPWMA/PUA), (3) Ulupa'u Head WMA Species/Habitat Enhancement (UHWMA/SHA), and (4) Ulupa'u Head WMA Public Use (UHWMA/PUA). The management actions listed also include needed improvements at an expanded level of effort, to the extent that funding, resources, and staff limits allow.

Element Category One: Species/Habitat Enhancement Actions at NPWMA

- Control invasive plants with established in-house and contractor resources and methods (e.g., manual, mechanical).
  - Supervise annual "Mud Ops" AAV maneuvers to enhance stilt nesting and foraging habitat.
  - Coordinate military "work parties" to assist natural resources staff with invasive plant removal.
  - Contract weed evaluation and removal projects, as appropriate.
- Control invasive plants with established volunteer-conducted activities.
  - Host weed-pulling service projects by interested organizations.
- Evaluate and improve (systematically) invasive plant control methods.
  - Monitor/improve existing methods and results.
  - Research replacement options and replace invasives with preferred vegetation.
  - Research/test new control methods.
  - Leverage resources with regional partners (e.g., see COA Component Plan 7.2.2).

[1] See Figure 4, Appendix B for locations of Nu'upia Ponds WMA and Ulupa'u Head WMA.

- Remove vertebrate predators (rats, cats, dogs, mongoose) using established methods.

  - Continue predator control program by Federal government personnel.
    Since 2001, execution of the predator control program in the sensitive NPWMA has shifted from being primarily executed by the MCBH wildlife technician and military police animal control staff to being implemented by contracted USDA Wildlife Services personnel. This has freed up some time for the MCBH wildlife technician, whose duties have shifted to that of law enforcement through his new responsibilities as a federally-commissioned conservation law enforcement officer under the Marine Corps' new Conservation Law Enforcement Program (see MCO P5090.4 and Section 4.4.1 for details).

  - Continue enforcement of animal control laws (e.g., leash laws, prohibitions on feeding feral cats, prohibition of pets in NPWMA).
    Since 2001, enforcement of animal control laws has been strengthened by the establishment of the MCO 5090.4 Conservation Law Enforcement Program and update of the Base Regulations, Chapter 4, Pet and Animal Control, in which it is made clear that free roaming dogs, cats or other animals (domestic or feral) are specifically prohibited on MCBH properties and particularly in wildlife management areas (See BaseO P5500.15B for further details). This conforms with the Navy policy issued in Chief of Naval Operations (CNO) Letter 5090 Ser N456M/10595820 of 10 January 2002 regarding prevention of feral cat and dog populations on Navy property.

- Evaluate and improve (systematically) vertebrate predator control methods.

  - Vary time, place, baits, trap types, and intensity of trapping; evaluate results; and improve trapping program design, where appropriate.

    Under the USDA Wildlife Services contract terms, MCBH Environmental Department and USDA Wildlife Services communicate regularly to determine which sites are high risks for predation and where new traps or bait stations are required. New trapping routes have been added or their placement shifted to better defend species of concern during the nesting seasons and to reduce predator presence within NPWMA. Use of diaphacinone bait stations has been added as an additional trapping technique at specific locations. (See Appendix F3 for related database management improvement efforts).

  - Expand community education activities regarding pet restraint and predator control (e.g., keeping domestic cats indoors and dogs on leash, reporting violators).

- Limit disturbance of nesting waterbirds with established methods.

  - Minimize nearby construction-related disturbances during nesting season (1 May–1 Oct).

    For example, the construction phase of INRMP Project HI60834 Complete Wetland Restoration/Percolation Ditch Improvements was completed between October 2005 and March 2006 to avoid the spring/summer nesting season of the endangered Hawaiian stilt at the nearby NPWMA.

  - Prohibit incompatible activities in/near pond habitat, especially during nesting season.

    For example, the Nu'upia Ponds Recreational Run Access Trail was deliberately routed along the outer-periphery road system of Nu'upia Ponds and designed to avoid the

sensitive nesting areas (as documented in the EA and Section 7 USFWS consultation completed for that project (Drigot 2002)). The authorized run route and rules of conduct are reprinted in Base regulations (BaseO P5500.15B), posted on MCBH's website.

- Maintain SOPs, signs, fences, security patrols, and enforcement of prohibitions.

- Continue established approach (opportunistic) to monitor fish and wildlife, evaluate results, and improve management.

  - Host and participate in State-coordinated semi-annual waterbird counts and Hawaii Audubon Society-sponsored Annual Christmas Bird Counts (see Figures 10a and 10b, Appendix B).

  - Conduct project-specific monitoring of birds, vegetation, etc. in response to specific improvements, outside requests, or permit conditions.

- Monitor fish and wildlife (systematically), evaluate results, and improve management.

  - Initiate additional fish monitoring surveys in the Ponds and compare to baseline fish survey results reported in Brock 1994.

  - Perform additional surveys to improve tracking the status of protected species (e.g., banding birds, tagging fish, counting nests).

    For example, in the 2006 nesting season, a MCBH contractor conducted systematic, weekly base-wide waterbird counts. Data collected on variables including numbers of Hawaiian stilt present, location of nests, hatching rate, and fledgling success has been entered and maintained in a Microsoft Access Waterbird Database (see Appendix F3).

- Explore interagency partnerships to expand cooperative monitoring of fish and wildlife on a regional basis.

Element Category Two: Public-Use Actions at NPWMA

- Support required on-site access by natural resource partner agencies.[2]

- Provide established resource-compatible on-site public access on a case-by-case basis.

  - Continue to support specific requests for escorted tours, service projects, etc. (see Outreach Table in Appendix G1 for details.)

[2] Section 11104.1.e of MCO P5090.2A states that Federal, state, and local conservation officials "will be permitted access to installation land and waters for official purposes after proper safety and security measures are taken." Section 11104.3.h further states that "When contracting fish and wildlife work, priority will be given to Federal, state, and local agencies having responsibilities for the conservation and management of fish and wildlife." The SAIA requires that military installation INRMPs "shall reflect the mutual agreement" of state and Federal fish and wildlife agencies concerning "conservation, protection, and management of fish and wildlife resources" (see Appendix A3).

- Provide additional resource-compatible on-site public access on a case-by-case basis.
  - Recruit and train volunteers from schools and community service organizations to assist in conducting pond tours.
- Display/distribute available presentation materials on fish and wildlife management.
  - Continue to reproduce and disseminate existing brochures at public forums such as New Arrivals Briefs and escorted Base environmental tours.
  - Maintain existing Interpretive Exhibit Pavilions and Displays showing NPWMA resources and management.
- Develop/distribute additional presentation materials on fish and wildlife management.
  - Develop additional brochures, newspaper articles, briefing materials, publications, videos, displays, websites, etc.

    For example, the "Masters of Amphibious Assault" poster was recently developed in the "Saving a Few Good Species" Partnership Poster Series between USFWS and USMC, celebrating the symbiotic relationship between AAV training and Hawaiian stilt habitat enhancement at Nu'upia Ponds. This poster was unveiled in a MCBH locally-hosted ceremony in January 2004, distributed locally and nationwide, and was posted on USMC's and USFWS's websites (see Appendix G2).
- Host established project-specific volunteer service actions.
  - Remove invasive plants (e.g., mangrove and pickleweed), plant and maintain native plant sites, and maintain tire-nest islands for Hawaiian stilt.

    For example, for years, the Sierra Club Hawaii Chapter has been co-sponsoring with MCBH regular weed pulling events in NPWMA for interested volunteers.[3]
- Expand project-specific volunteer service actions.
  - Offer volunteers opportunities to participate in research and/or monitoring activities (e.g., bird counts, native plant establishment/maintenance, and water quality monitoring).
- Provide off-site public outreach about fish and wildlife management.
  - Provide public briefs, displays, videos, website information, etc.

    A recent example is MCBH's invited display at the August 2005 White House Conference on Cooperative Conservation in St. Louis, MO, attended by over 1,000 invitees from a variety of public resource management agencies and non-governmental organizations across the nation who partner on fish and wildlife management. Two case studies of MCBH Cooperative Conservation Successes were highlighted at the conference, published in the Conference Proceedings, and posted at a cooperative partner website (see Appendix G2).

[3] "Sierra Club and Marines Partner for Endangered Birds" (Drigot and Kaohelaulii 2004, local chapter newsletter) and "Hawaii – A Few Good Species" (Kinik 2005, national magazine) favorably mention this ongoing Sierra Club/Marine Corps partnership (see Appendix G2).

- Explore interagency cooperative partnerships to coordinate public education/access activities.

  - Provide shared docents, interns, etc.

- Develop interagency mechanisms to inform the public about resources, access and volunteer service options.

  For example, such an interagency mechanism exists between MCBH and the Sierra Club Hawaii Chapter. The above-cited Sierra Club co-sponsored volunteer weed removal projects at NPWMA are regularly posted in the Sierra Club chapter newsletter and reprinted in Honolulu daily newspapers. Also, the annual Hawaii Audubon Society volunteer Christmas Bird Count hosted at MCBH is publicized in their *'Elepaio* newsletter.

Element Category Three: Species/Habitat Enhancement Actions at UHWMA[4]

Before listing the INRMP actions under this element, it must be emphasized that MCBH does not control its own fire department and the MCBH/Environmental Department/INRMP does not perform the lead role in funding and implementing fire fighting response responsibilities at MCBH. Instead, lead responsibility resides with a partner agency, the Federal Fire Department, for both shelter and wildland brush fire response and control. They are assisted, where possible, with military operator support. Fire fighting procedures for the Ulupa'u RTF are spelled out in Chapter 9 of BaseO 3574.6. Another Fire Bucket Standby Order (BaseO 3000.1A Ch1) details responsibilities of military units to assist Federal or civilian firefighters in fighting fires that may occur on government-owned or leased lands or during State of Hawaii emergencies. The Federal Fire Department is notified by MCBH G-3 range managers when brush fires are a problem. G-3 is responsible for maintaining the BaseOs listed above dealing with fire response; and is currently updating/consolidating various wildland fire fighting-related directives under a new BaseO 3000.1B, Wildland Fire Management Plan (draft in prep, 2006).

While Federal Fire Department and G-3/military operators have primary control over maintaining and improving fire-fighting capabilities at the RTF, the MCBH G-4/Environmental and Facilities Departments provide assistance in various ways. The Environmental Department's role, through INRMP implementation, is to provide technical assistance on reducing fire risk when vulnerable natural resources are involved (e.g, red footed boobies and their tree habitat adjacent the weapons firing range). With or without the presence of such vulnerable natural resources, the G-4/Faciilities Department plays a broader role in on-going grounds maintenance/vegetation management/herbicide application – where appropriate – to control flammable vegetation at the RTF.

- Move birds away from high-risk target areas using established methods.

  - Maintain artificial nesting platforms erected in safer, less fire-prone sections of the WMA (see for details, Rauzon and Drigot 1999).

  - Discourage birds from nesting/roosting in the "line of fire" by destroying potential roosts in that area.

[4] The 2001 INRMP/EA management action "Update Ulupa'u Head WMA Boundary map to reflect current conditions" was completed with the publication of the 2001 MCBH INRMP/EA.

- Plant/maintain field stock trees in safer locations to attract birds.

- Replace fire-prone vegetation using established methods.

  - Schedule regular brush control and selective herbiciding of weeds along firebreaks.

  - Plant and maintain native ground cover (where practicable) to replace more fire-prone invasive grasses.

- Maintain fire-fighting capabilities using established methods.[5]

  - Track and facilitate, where possible, the regular training of Range, Federal Fire Department, Safety, Environmental, and tenant user personnel in brush fire control techniques. (This training is primarily coordinated through the MCBH Safety office but Environmental facilitates networking and interagency communication among relevant MCBH units, State Foresters, and others involved in wildland fire control issues).

  - Ensure maintenance of existing firebreak roads, water delivery system, the newly installed geotextile matting/weed suppressant ground cover, and water cannons.

    See INRMP implementation annual progress reports in Appendix E2 for further details about the latest additions to fire-fighting capabilities installed at UHWMA.

- Improve fire-fighting capabilities.

  - Help Range personnel research, select, and sustain the latest brush-fire fighting equipment and techniques.

    For example, during the first five years of INRMP/EA implementation, both use of geotextile matting to suppress weed-growth near booby-nesting tree clusters to reduce fire risk and placement of remote-controlled water cannons near key nesting trees were trialed (See MCBH projects HI21007 and HI21008, detailed in progress reports in Appendix E2). At time of writing, project HI21007, the gravel-anchored geotextile matting in strategic areas near booby-nest trees, was fully installed in January 2005 and has helped to successfully arrest spread of recent brush fires into sensitive nesting tree habitat during August 2005 and June 2006 Range fire outbreaks. Project HI21008, which installed four water cannons in the Crater, is in the final stages of design customization to address unique Crater environmental conditions and should be finalized and fully functional by early CY2007. See COA Component Plan 7.5.3 for additional details.

  - Evaluate feasibility of prescribed burns in the most sensitive, fire-prone areas and implement, as appropriate, if evaluation results, interagency consultations, environmental documentation and permits are obtained.

- Remove vertebrate predators (rats, cats, dogs, mongoose) using established methods.

  - Continue predator control program by Federal government personnel.

    While predator control in the NPWMA has shifted from being primarily executed by MCBH natural resource and military police animal damage control staff to contracted USDA Wildlife Services personnel, the same is not true for the Ulupa'u Head WMA. Due to logistical and access challenges, MCBH's in-house wildlife technician/conservation law

[5] For further details, see *Ulupa'u Crater Fire Management Study* (BCH 2002) and the Base Orders pertinent to brush fire management referenced therein.

enforcement officer continues to perform this action at this location; often he must do so during irregular hours (i.e., evenings and weekends) when the weapons range is not active. The need to plan predator trapping schedules around a dynamic weapons range schedule is not conducive to being contracted out to off-site USDA Wildlife Services personnel.

- Continue enforcement of animal control laws (e.g., leash laws, prohibitions on feeding feral cats).

- Evaluate and improve (systematically) vertebrate predator control methods.[6]
  - Improve predator control.
  - Improve enforcement techniques.
- Continue established approach (opportunistic) to monitor status of protected species, evaluate results, and improve management.
  - Conduct bird surveys such as Annual Christmas Bird Counts with the Hawaii Audubon Society and opportunistic monitoring of nesting patterns (see Figure 10b, Appendix B).
  - Perform project-specific monitoring of birds, vegetation, nesting tree health, etc. in response to specific improvements, outside requests, permit conditions, etc.
- Monitor protected species' status (systematically), evaluate results, and improve management.
  - Increase frequency and diversity of bird monitoring activities, especially in newly-enhanced areas and nesting platforms at the Crater (nest counts, fledgling status, banding studies, etc.).

Element Category Four: Public-Use Actions at UHWMA

- Support required on-site access by natural resources partner agencies.[7]

  For example, the red-footed booby colony at the UHWMA regularly serves as an indicator of the extent of natural resources damage to seabirds from oil spills in Hawaiian waters. The boobies found here forage widely in marine waters around the Hawaiian Islands during the day before returning to their roosts here each night. USFWS finds it helpful to access the Crater right after a marine oil spill in Hawaiian waters to monitor the extent to which any seabirds return with oiled feathers from spill exposure. MCBH has also hosted USFWS-sponsored Natural Resources Damage Assessment field training for relevant personnel at the UHWMA.

[6] Due to legal and liability sensitivities, a 2001 recommendation to use trained volunteers for predator control has been dropped from further consideration.
[7] Op cit 2.

- Provide on-site public access within limits set by mission, safety, and natural resource sensitivities.

  - Continue on-site tours to the booby colony and the fossil bird bone sites, to the extent allowed by range firing priorities, recently heightened escort/safety requirements, and other constraints (see Outreach Table in Appendix G1 for details).

  - Streamline the limited Crater access program by accommodating tour requests on a scheduled basis rather than case-by-case, in response to individual requests.

    For example, in February 2006, Department of Defense and Headquarters, Marine Corps environmental staff joined MCBH to host a special field visit to the Crater and other MCBH natural resources points of interest, by a consolidated set of representatives from a number of key national non-governmental environmental organizations (e.g., the Sierra Club, Audubon, Earthjustice, Defenders of Wildlife, National Wildlife Federation, The Nature Conservancy).[8]

- Provide off-site public education program to compensate for limited public access to natural resources.

  - Offer remote-observation tours and classes at the Range bleachers and Interpretive Pavilion locations; and/or videotapes of the booby colony and fossil bird bone site for tour groups that cannot be accommodated on-site.

- Display/distribute available presentation materials on wildlife management.

  - Continue to reproduce and disseminate existing brochures at public forums such as New Arrivals Briefs and escorted Base environmental tours.

  - Maintain existing Interpretive Exhibit Pavilions showing UHWMA resources and management.

- Develop/distribute additional presentation materials on wildlife management.

  - Develop additional brochures, newspaper articles, briefing materials, publications, videos, displays, websites, etc.

- Host established project-specific volunteer service actions within limits set by mission, safety, and natural resource sensitivities.

  - Continue activities such as nest counts, nest platform repair, removal of invasive plants, and maintenance of native plants (see Outreach Table in Appendix G1 for details).

- Expand project-specific volunteer service actions within limits set by mission, safety, and natural resource sensitivities.

  - Expand opportunities for volunteers to engage in research and monitoring activities (e.g., bird nesting surveys, evaluating revegetation success, artificial bird nest platform usage).

- Coordinate interdepartmental MCBH staff public access/education program on natural resources and management.

[8] See "Boots on the Ground, Birds in the Nest", Sierra Club Insider, March 21, 2006 and Oakes 2006 reprinted in Appendix G2.

- Explore interagency cooperative partnerships to monitor natural resources.
- Explore interagency cooperative partnerships to coordinate public education/access activities.
- Develop interagency mechanisms to inform the public about resources, access and volunteer service options.

Objective 7.1.2: Increase emphasis on Fish and Wildlife Management Program elements at MCBH-KB outside the two WMAs.

MCBH's Environmental Department has been increasing emphasis placed on fish and wildlife management at areas on Mokapu outside Nu'upia Ponds WMA and Ulupa'u Head WMA. The following management actions help fulfill this objective.

- Conduct monitoring of protected/pest fish and wildlife in small wetlands at MCBH-KB and appropriate follow-on actions.

  For example, such monitoring was done just before, during, and immediately after the construction of HI80726 Golf Course Pond/Endangered Waterbird Enhancement Project, as documented in the final project report (HDA 2004).

- Incorporate updated fisheries/marine mammal policy into Base Plans, Projects, and Protocols as appropriate.

  Policy clarification is needed especially with regard to recreational fisheries access, sustainable yield, indigenous access, marine mammal protection protocols, and Essential Fisheries Habitat designations in MCBH's 500-yard buffer zone. This will help improve coral reef ecosystem management within MCBH-KB's 500-yard buffer zone around Mokapu Peninsula. This clarification should be reflected in updates to the Master Plan, Base Regulations, training SOPs, etc. (See COA Component Plan 7.4 Coastal and Marine Resources Management and COA Component Plan 7.6 Outdoor Recreation, Quality of Life, and Outreach Management for further details).

Objective 7.1.3: Develop and implement a Fish and Wildlife Management Program on MCBH parcels outside MCBH-KB.

During the first five years of INRMP implementation, MCBH's Environmental Department began to develop, expand, and refine a deliberate fish and wildlife management program to include all MCBH properties, not just MCBH-KB, that were recently consolidated under MCBH control and jurisdiction.

One of those areas is Waikane Valley Impact Area. While Waikane Valley has been recently "closed" and transferred to the MMRP program (see Section 4.3.3 and 8.1.10) for final clean up action and ultimate decisions on future disposition, there are natural resources assets and threats in the valley that remain at risk or become a risk (e.g., assets include such things as healthy stream habitat along Waikane Stream; threats include unhealthy erosion along valley cliffs, encroachment of invasive broomsedge vegetation that aggravates erosion risk, and invasion of rats, pigs, mongooses, and feral cats). For example, it is undesirable to have a feral cat colony become established in the valley or to have poaching by pig hunters. In addition to on-going monitoring/enforcing access restrictions in the valley by Base military police and response to natural resources compliance issues by MCBH's conservation law enforcement officer, the following project is programmed toward meeting this objective.

- HI20018 Assess Natural Resources Status of Waikane Valley

  To implement minimum basic natural resources stewardship responsibilities until the MMRP program fully 'kicks in' and determines future clean up schedule and ultimate disposition of the property, MCBH must, for example, periodically do walk through surveys of the stream valley and conduct at least visual surveys of erosion trends (e.g., direct observation and/or time-series aerial photo interpretation, and/or install and check erosion monitoring devices). These surveys would also detect any emergency deterioration of resource conditions that could affect the larger valley or downstream resources if they are neglected and recommend corrective action. This study would perform a reconnaissance survey, possibly a rapid bioassessment of stream conditions, and make recommendations for any future monitoring either by periodic visits and/or by installing remote control monitoring devices that can be checked remotely or less frequently.

  Such a reconnaissance survey has been programmed for FY2008. Depending on outcome and whether the MMRP program responsibilities have fully 'kicked in' or not, one more survey is scheduled in FY11 under this INRMP update. If such periodic assessments are not conducted, MCBH will be failing to live up to its natural resources stewardship obligations under the Sikes Act for all MCBH properties with significant natural resources.

Invasive species continue to be one of the most important wildlife management issues at all MCBH parcels outside MCBH-KB (see INRMP implementation annual progress reports in Appendix E2 for examples of progress made from 2001-2006 in addressing this objective). Managing invasive/nuisance wildlife is a continuing important management issue at MCBH-KB, as indicated by actions covered in the preceding sections of this document, as well as the above-cited progress reports. The following management actions address these invasive/nuisance animal species management requirements primarily as they occur on MCBH parcels outside MCBH-KB (see COA Component Plan 7.5 Grounds Maintenance and Landscaping Management for related actions being undertaken with respect to nuisance plant control on these parcels).

- Evaluate and implement appropriate recommendations from the HI20012 Invasive Species Management Study (ISMS).[9]

  This is an on-going action, as the ISMS was rich with many recommendations linked to INMRP goals and objectives that are being evaluated and addressed, where appropriate, over the next five years of INRMP implementation (Garrison et al. 2002). See COA Component Plan 7.5.2 Grounds Maintenance and Landscaping Management for further discussion of follow-on work related to ISMS recommendations that has occurred since the study's completion.

- Implement closer integration between established pest management plans and invasive species management activities.

  This is occurring. For example, the 2000 MCBH Pest Management Plan is undergoing another regular five-year update at time of this writing (see *Draft MCBH Pest Management Plan*, NAV FAC Pacific 2006). The latest revision effort cross-references information in the 2001 INRMP/EA and the 2002 HI20012 ISMS (Garrison et al. 2002). In addition, one of the MCBH natural resources management staff members has been assigned the role of Integrated Pest Management Coordinator in this draft MCBH Pest Management Plan update (2006), thus ensuring additional opportunities for closer integration between the Pest Management Plan and the INRMP, and continued consideration of relevant recommendations from the ISMS in the updated Pest Management Plan implementation.

Objective 7.1.4: Document and share results of inventories and monitoring of protected/pest species and habitats and improve data management systems.

MCBH has made significant progress in improving data collection and reporting practices in MCBH's nuisance wildlife and predator control program since publication of the 2001 INRMP/EA. See COA Component Plan 7.7 Resource Information Management and Appendix F3 for further details).

- Continue reporting on monitoring efforts and perform related data management in response to specific requests and requirements.

- Evaluate current status of monitoring reports and related data management and identify requirements for system improvements.

  For example, a contractor for MCBH has developed a reporting form which was put into use in early 2006. This form, entitled an Injury, Illness, Mortality, Salvage (IIMS) Report, records detailed information on incidents involving injuries, illness, or fatalities of birds brought to staff attention (see Appendix F3 for an example of a completed IIMS Report). Data from this form will be collected and consolidated into an improved annual report to USFWS each year as part of the bird handling renewal permit requirement.

[9] The 2001 INRMP/EA management action "Complete HI20012 Invasive Species Management Study" was completed in 2002 (Garrison et al. 2002).

- Continue designing/implementing system improvements to take advantage of extensive existing information on MCBH's protected/pest species.

  See COA Component Plan 7.7 Resource Information Management for further details.

- Improve capability for staff access to the MCBH EGIS for information sharing on protected/pest species.

  See COA Component Plan 7.7 Resource Information Management for further details.

Objective 7.1.5: Assist implementation of a Bird-Aircraft Strike Hazard (BASH) Management Program at MCBH-KB's airfield.

Since 2001, there have been several improvements in the organization and operation of the BASH Program at MCBH-KB. It should be emphasized that BASH is not a component of the INRMP but a separate operating program required at all Navy airfields, including Marine Corps Air Facility (MCAF) at MCBH-KB. On 15 November 2004, a MCAF BASH Plan was published that spells out the details of BASH program operations and responsibilities (MCAF Air Field Operations Department 2004). This plan mirrors the organization of BASH programs at other Navy airfields. The MCAF airfield manager, not the environmental staff, is in charge of implementing the BASH program. However, MCBH natural resources staff continue to play a technical assistance role in ensuring the environmental requirements are met. BASH activities continue in much the same fashion as described in the 2001 INRMP/EA (p. 7.1-12). Instead of MCBH natural resources staff playing a primary role in monitoring the flightline for bird activity, hazing the birds away, and training military aviation support staff assistants to properly operate the propane cannon and other non lethal means to haze birds (as reported in the 2001 INRMP/EA), these duties are now shifted to that of BASH professionals with the USDA Wildlife Services under a Cooperative Service Agreement with MCAF. The MCBH wildlife technician continues to assist in program implementation (e.g., in coordination with USDA Wildlife Services contracted personnel) and with hands-on airfield monitoring, when needed. However, MCBH natural resources staff's primary role in this program is to provide an oversight role to ensure environmental requirements are met as spelled out in the current MCAF BASH Plan (15 Nov 2004).

In addition, MCBH Environmental Department remains in charge of ensuring MCBH maintains an annually-renewed depredation permit from the USFWS, covering any authorized harassment or lethal control of migratory birds protected under the Migratory Bird Treaty Act. MCBH natural resources staff consolidate BASH data on reports of bird harassment/strikes that are maintained by USDA Wildlife Services and MCAF personnel into an annual report to USFWS when assisting MCBH to apply for renewal of the required USFWS depredation permit (see Appendix F3).

In the context of playing an advisory, not a central, role in BASH program management, over the next five years of INRMP implementation, MCBH natural resources staff will:

- Ensure MCAF and their USDA/Wildlife Services contractors continue the established data collection and management system for BASH as described in the current MCAF BASH Plan.

- Ensure MCAF and their USDA/Wildlife Services contractors develop an improved data collection and management system for BASH.

- Track airfield staff in proper execution of their BASH Program responsibilities as spelled out in the current MCAF BASH Plan and to regularly update the plan, as required.

- Identify and assist appropriate MCBH and contractor personnel to incorporate BASH considerations into airfield and other Base SOWs, Plans, and Project Specifications.

  For example, advise facilities planners and design engineers and others working on flightline and other Base utilities infrastructures to ensure that airfield and other night lights are down-shielded to minimize attraction of federally-protected seabirds such as shearwaters.

Objective 7.1.6: Track and manage impacts of other agency plans on MCBH's protected/pest species management activities.

There is an ongoing need to track other agency plans and manage their associated impacts on MCBH's pest and protected wildlife management activities. This will be accomplished by continuing to gather, evaluate, and respond to information. See Section 8 for additional details.

- Gather and review information through meetings, reports, and other media.

- Participate in interagency initiatives on invasive species problems.

- Collect and evaluate information on other agency plans impacting MCBH fish and wildlife activities.

- Improve data management, agency contacts, and response to other agency impacts.

- Implement revisions in data management system as necessary.

Objective 7.1.7: Catalyze regional ecosystem-level protected species enhancement/ invasive species control efforts.

There is a need for greater regional Koʻolaupoko-wide stewardship of Hawaiian stilt and other protected fish and wildlife species whose lifecycles occur on MCBH parcels but also extend beyond the boundaries of individual agency real estate holdings. MCBH has begun to help initiate such efforts for species of

concern that reside on MCBH parcels through both habitat enhancement and invasive species control efforts. See below, COA Component Plan 7.4 Coastal and Marine Resources Management and Section 8 for additional details.

- Evaluate and implement appropriate recommendations from the HI95156 MCBH Hawaiian Stilt Regional Recovery Study.

  The *MCBH Support of Hawaiian Stilt Regional Recovery in the Ko'olaupoko District, O'ahu* study (HI95156) (Rauzon et al. 2002) clearly documented the region-based requirements and current activities underway to recover habitat for the endangered Hawaiian stilt in the Ko'olaupoko area, and was favorably cited in the USFWS's current update of their *Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005).[10] Other aspects and recommendations of this MCBH study will be consulted over the next five years of INRMP implementation when undertaking relevant follow-on actions.

- Host appropriate projects to enhance habitat of fish and wildlife on and around MCBH land and water parcels.[11]

  For example, invasive mangrove encroachment in freshwater streams, marshes, coastal wetlands, fishponds, estuaries, and bays within the Ko'olaupoko region have significantly reduced available nesting habitat for Hawaiian stilt and the three other endangered Hawaiian waterbirds found on MCBH parcels and elsewhere within Ko'olaupoko. While various mangrove removal efforts—large and small—including major mangrove removal success at MCBH's Nu'upia Ponds, have been occurring by private and public efforts throughout this area, stewardship of Hawaii's waterbirds could be performed more cost-effectively if done in a more regionally-coordinated fashion. See COA Component Plan 7.4.1 for further details about MCBH's recently initiated project (HI0920017M Invasive Mangrove Remove-K-Bay Shoreline) that will remove invasive mangrove and its deleterious impacts on fish, wildlife, and physical security of MCBH-KB borders from the coastlines along the H-3 causeway near the Base entrance gate. Partnering with the State and other regional stakeholders is required to bring this project to successful completion since this mangrove encroachment is in waters that are partially within MCBH control and partially within control of the State of Hawaii.

- Improve regional capacity to plan for, reduce risks, assess and recover from damages to fish and wildlife due to catastrophic events.

  Per Natural Resource Trustee obligations (see Section 8.1.11), MCBH must appropriately plan for and respond to damage from oil spills, hurricanes, tsunamis, brush fires, and other potentially catastrophic environmental events. MCBH carries out these obligations in various ways. For example, under terms of MCBH's Spill Response Contingency Plan, MCBH regularly hosts US Coast Guard-run spill drills, with the benefit of participating experts from the Clean Islands Council, with whom MCBH has a cooperative agreement. MCBH regularly requests participation of USFWS and State DLNR personnel in these drills during which response to anticipated wildlife damages and damage claims are team-rehearsed as built into the drill scenarios. Improvements in the Coast Guard's incident response system within

[10] The 2001 INRMP/EA management actions "Complete HI95156 MCBH Hawaiian Stilt Regional Recovery Study" and "Provide input to finalization and implementation of USFWS's Regional Waterbird Recovery Plan (USFWS 2001)" were completed during the previous INRMP implementation period.

[11] The 2001 INRMP/EA management action "Host appropriate projects to control invasive species and habitats on/around MCBH" was incorporated into this management action.

which MCBH must operate are in process, in cooperation with USFWS staff, to further improve regional capacity in this area. Similar improvements are also needed in regional brushfire control coordination and in response to potentially catastrophic environmental events such as an outbreak of avian flu. MCBH's natural resources staff continue to participate in regional planning, training, and drills to the extent possible in order to make continuous improvement in addressing this objective.

- Improve regional capacity to protect, reduce risks to, and rehabilitate fish and wildlife and/or their habitat affected by IR program contaminated sites.

Implementing this action involves close collaboration between Installation Restoration (IR) and INRMP program managers, USFWS environmental toxicologists, USEPA, State DLNR, State DOH, and other appropriate agencies to ensure any site clean-up activities are protective of fish and wildlife resources and incorporate habitat rehabilitation measures into remedial actions to enhance fish and wildlife resources at these sites, where appropriate. Over the first five years of INRMP/EA implementation, MCBH natural resources staff have played an active role in reviewing and commenting on Air Force-led efforts to develop an appropriate clean-up plan for contaminated sites transferred from Air Force to USMC/MCBH jurisdiction at MCTAB, to include appropriate provisions to protect nearby Waimanalo Stream aquatic life, reduce potential for disturbance and spread of invasive species (e.g., Fountain Grass), and minimize erosion impacts from increased IR activities in the areas affected. Details of that program can be found in IR program documents.

One short example will illustrate how natural resources staff interface with IR personnel to ensure better attention to INRMP-related concerns in IR activities at the areas affected. One IR Site (referred to as Disposal Area 101; Formerly Area of Concern (AOC 18)) on MCTAB contains a World War II trash deposit and was planned for trash extraction by the Hickam Air Force Base IR program personnel as part of the IR clean-up program. Increased truck traffic of an existing unimproved road was anticipated as contractor activities at the site increased. MCBH natural resources staff expressed concerns during review of the work plan that appropriate BMPs be installed along the road so that erosion did not intensify and result in sediment-laden storm water runoff into nearby Waimanalo Stream. Partially in response to these concerns, the Air Force ensured their contractors hired necessary expertise to design appropriate BMPs and monitor the environmental consequences of their installation. The desired result was attained and the improved gravel-surfaced road was installed accordingly (see SRGII 2005a). The same kind of review and oversight activities will be engaged by MCBH natural resources staff at other MCBH sites to be evaluated in the IR Program at MCTAB, MCBH-KB, and in the similar Military Munitions Response Program (MMRP) at Waikane Valley Impact Area over the next five years to ensure compatibility with INRMP goals, objectives, and management actions. In addition, whenever MCBH natural resources staff are visiting any of the areas containing IR sites, general vigilance will be sustained to report anything unusual in the appearance of the site to the installation IR program managers for appropriate follow-on action.

Objective 7.1.8: Optimize effectiveness of both fish and wildlife protection and invasive/pest species control.

At the time of the 2001 INRMP/EA publication there was a need to improve the effectiveness of fish and wildlife protection and invasive/pest species control through better organization, education, enforcement, and outreach. For example, the exact roles and restraints governing the operation of assigned Military Police (MP) Game Wardens and voluntary auxiliary game wardens under MP jurisdiction in relation to the professional work of MCBH's natural resources staff in the areas of fish and wildlife enforcement and trapping/removal of nuisance species needed to be clarified. In addition, at that time, MCBH was required to address a Finding during the 1999 Environmental Compliance Evaluation that it "does not carry out the enforcement of wildlife laws using trained enforcement officials under the direction or coordination of the wildlife manager. Enforcement is presently carried out by MPs who have little or no training in natural resources and the range of regulatory elements that they could be called upon to enforce."

The management actions required at that time are re-listed below (identical to those listed in the 2001 INRMP/EA), but with a brief statement about progress made since then. This progress demonstrates that concerted efforts have been taken for all management actions listed, though many are still "in progress" while others will be "continuous" in nature.

- <u>Formally assign fish and wildlife protection and/or control duties to MCBH personnel who assist MCBH natural resources staff.</u>

  As part of a USMC-wide move to civilianize many non-combat related functions of the Military Police Department, the Military Police (MP) animal control function is now overseen by two animal control officer civilian billets in the MP Department occupied by support technicians whose routine duties include performance of basic nuisance dog and cat control and other related functions in the residential/industrial locations on Base. They also assist MCBH natural resources staff by responding to nuisance, injured, or dead wild bird incidents and other wildlife problems found in the domestic communities on Base. They share their data collected on wild bird incident responses, for example, with the Environmental Department so that natural resources staff can include them as part of the Base's bird handling permit reports required by the USFWS bird handling permit renewed each year.

  A clear line of distinction has been made that the MP animal control officers do not perform bird handling or trapping duties in MCBH's wildlife management or other jurisdictional wetland areas on Base, since these areas are covered by MCBH's natural resources staff with the contracted assistance of USDA Wildlife Services professionals. The civilian MP animal control staff also assist natural resources staff during emergency situations such as at a Crater brush fire, where natural resources staff responders may need assistance in transporting any affected seabirds to an authorized emergency rehabilitation facility or during a marine oil spill response, when assistance is needed in collecting dead or injured wildlife as part of a wildlife rehabilitation or natural resources damage assessment effort.

  Despite these improvements in clarifying duties and constraints among those who assist the natural resources staff function, they have not all been formalized and additional progress is needed in this area.

- Ensure relevant personnel obtain focused training on proper protection and/or control of fish and wildlife species.

  As detailed in Section 4.4.1, in FY03, MCBH's natural resources/wildlife technician became the first USMC civilian student to complete rigorous 3-month Federal law enforcement training to become a commissioned Federal conservation law enforcement officer and help launch USMC's conservation resource enforcement program detailed in a new Marine Corps Order (MCO 5090.4).

- Regularly review and update staff training to ensure latest management and/or control policies, regulations, and techniques are included.

  Since receiving his basic commission, MCBH's wildlife technician/conservation law enforcement officer attends required annual training in subjects necessary to maintain his commission. MCBH natural resources staff also need to assist in regular review of the training received by the newly-civilianized MP animal control officers and other support personnel to ensure that they are getting appropriate formal training opportunities in their targeted areas of support. In the meantime, the MCBH wildlife technician/conservation law enforcement officer assists them and their MP supervisors in understanding the public sensitivities and legal aspects and limits of their nuisance animal and injured wildlife response responsibilities.

- Clarify wildlife enforcement policy, identify lead responsible unit at MCBH and make appropriate recommendations for improvement.

  As explained above, new MCO 5090.4 has clarified USMC wildlife enforcement policy, and has identified that a properly trained civilian Conservation Law Enforcement staff be the unit to carry it out. (See Section 4.4.1 for further details). However, MCBH needs to make additional progress (underway) to fully implement the new MCO requirements over the next five year period of INRMP update implementation.

- Evaluate placement of wildlife and natural resources enforcement billet in MP or LE and implement appropriate recommendations.

  At time of writing, a MCBH Conservation Law Enforcement billet is being established and will reside in the MCBH Environmental Department but with a close cooperative working relationship with the MP animal control staff, as well as with other relevant staff who play a key role in this area (e.g., waterfront operations personnel who assist law enforcement officers in coastal and offshore areas). Additional progress during the next five years of INRMP implementation will lead to an improved program, further clarifying proper placement of enforcement functions of the various support units involved.

- Continue to implement established awareness programs on MCBH's wildlife protection and control efforts.

  Continue to distribute brochures and emphasize what every individual can do to reduce wildlife threats in all relevant MCBH parcels and activities in the ongoing SOP environmental awareness training class regularly conducted by MCBH Environmental Department staff.

- Evaluate placement of a volunteer coordinator billet in LE and implement appropriate recommendations.

  While this management action is not as high a priority as the need to set up a Conservation Law Enforcement billet, it is still a valid management action to consider in future years as time and resources permit. MCO P5090.2A, Section 11104.1.i states that Marine Corps installations "may use appropriate partnerships and volunteers to enhance conservation programs whenever practicable. This work will be performed under the direction of professionally trained natural resources personnel." If a regular staff member were available to dedicate focused time on services such as escorted tours in the WMAs and volunteer participants, more natural resource enhancement projects could be performed by volunteers at less overall cost. Related recommendations discussed in the *Final Report, Guidance for the Preparation of a Community Caretaker/Partnership Plan* (Maly et al. 1997) need to be revisited, evaluated, and implemented, as appropriate.

  Continuation of the MP-coordinated volunteer auxiliary game warden program is undergoing internal evaluation. Concerns about liability, safety, lack of appropriate training, lack of search and seizure authority, etc. have already curtailed the actions of the auxiliaries who formerly performed some basic enforcement functions such as checking currency of patron's fishing passes for the MP Department. Whether they can play any legitimate role in this area or whether their duties could be shifted to another more appropriate arena, is now undergoing investigation. Resolution of the future status of this program is unresolved but under active review at this time of writing.

- Develop and apply performance measures to improve effectiveness of both fish and wildlife protection and pest species control.

This page intentionally left blank.

7.2 WETLAND MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Wetland protection is a significant component of natural resource management at MCBH as reflected in the INRMP actions described in this component plan. This emphasis complies with Section 11201.3 of MCO P5090.2A, which clearly states that Marine Corps installations will "comply with the national policy to permit no overall net loss of wetlands," and "will ensure that all facilities and operational actions avoid to the maximum degree feasible, wetlands destruction and degradation...". Any facility requirement that cannot avoid wetlands "must be designed to minimize wetlands degradation and must include compensatory mitigation as required by wetland regulatory agencies…". Any action affecting wetlands (adverse or positive) must be "addressed in an environmental document prepared pursuant to the National Environmental Policy Act."

In addition to wetland safeguards mentioned above, Clean Water Act Sections 401 and 404 set up permitting programs that prohibit arbitrary filling or disturbance of navigable waterways, including jurisdictional wetlands. MCBH wetlands provide valuable habitat for Hawaii's endangered waterbirds, and a variety of migratory shorebirds, seabirds, native fish and shellfish (see COA Component Plan 7.1, Fish and Wildlife Management and species lists in Appendix C for details). Wetlands, both natural and human-made, represent a critical component of watershed health. They maintain or restore hydrological functioning, as well as provide fish and wildlife habitat, aesthetic and recreational values. The natural "cleansing" properties of wetlands are held in such regard that storm water regulations recognize "constructed wetlands" as a Best Management Practice (BMP) tool available to reduce non-point source pollution (Section 20104.3.e.(2)(c) of MCO P5090.2A). This is further detailed in COA Component Plan 7.3 Watershed Management.

MCBH properties at Mokapu (MCBH-KB) and Waimanalo (MCTAB) support relatively important wetland areas within the regional Koʻolaupoko ecosystem. On MCBH-KB, these include the Nuʻupia Ponds complex and smaller wetland pockets on Mokapu Peninsula located on historical estuarine or marshlands. Several of the smaller wetlands are either created wetlands (e.g., storm water retention basins on the Golf Course), or located on low-lying fill areas where wetland conditions have evolved along the Mokapu shoreline. On MCTAB, wetland areas are primarily associated with Waimanalo Stream, which flows through the property. See Figures 6 and 14, Appendix B, for wetland locations on MCBH properties.

For an overview of MCBH wetlands in a regional Koʻolaupoko ecosystem context, see Figure 3, Appendix B. While the scale on this map does not show all the smaller wetlands, it does show that MCBH's wetlands are located in a region containing numerous wetlands and wetland pockets which represent many small habitat fragments that are utilized by Hawaii's endangered waterbird populations. Take the Hawaiian stilt, for example. Per the MCBH Hawaiian stilt regional recovery report (Rauzon et al. 2002), there is evidence to show that Hawaiian stilts fly among wetlands on MCBH lands, to off-base parcels in this region, as well as to other Oʻahu sites and off-island wetlands. Individual birds move around among various nesting and feeding sites among these dispersed wetlands based on variables such as water quality, food availability, time of year, human and predator disturbance. Island-wide, the stilts form a

metapopulation, defined as "distinct aggregations of interacting individuals of a species whose local dynamics are distinct from, but affected by, neighboring populations of the same species" (Hanski and Gilpin 1991). Band recoveries show stilts also move inter-island among widely scattered breeding centers (Reed et al. 1998, cited in Rauzon et al., 2002). "The central concept of metapopulation dynamics—that a constellation of partially isolated patches can yield overall stability to a system that is chaotic at the level of the individual patch—offers an important new way of thinking about the conservation and management of populations dispersed among small habitat fragments" (McCullough 1996). In short, the wetlands of Ko'olaupoko, of which MCBH wetlands are a significant part, represent an inter-related patchwork of small habitat fragments for Hawaiian stilt and other endangered Hawaiian waterbirds whose significance can be seen as a whole that is greater than the sum of its parts. MCBH wetlands represent an important piece of this regional patchwork of wetland habitats and the positive regional consequences to endangered waterbird populations of the management enhancement activities undertaken at MCBH wetlands are important to keep in mind when reviewing this wetland COA component plan.

Goal 7.2: Wetland Management

Protect, enhance, and restore wetlands from loss or degradation to the maximum extent possible, consistent with the military mission and related wetland laws and regulations.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.2. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.2.1: Identify, map and characterize all MCBH wetlands.

There is a need to delineate and map wetlands and provide information to all that have the potential to affect wetlands for compliance and/or management purposes. US Army Corps of Engineers (ACOE) regulatory wetland delineation criteria are codified at 33 CFR 328.3. These criteria are further defined in the ACOE 1987 Wetland Delineation Manual in current use for wetland jurisdictional boundary determinations.[1] The protocols outlined in this manual determine the outer boundaries of various wetlands that fall under the category of jurisdictional wetlands; i.e., permits are required to perform actions in and/or affecting them, regardless of wetland type (see detail Objective 7.2.1, 2001 INRMP/EA).

[1] A rewritten 1989 manual was in use for awhile, but a Memorandum of Agreement was signed with the Natural Resources Conservation Service, the USEPA, and the USFWS to discontinue using the 1989 manual and to use the 1987 manual instead.

An important management action completed in the first five years of INRMP implementation was to survey all MCBH parcels, and review, update, or create—where appropriate—the jurisdictional wetland boundaries on relevant MCBH parcels. Delineated wetlands can be found at MCBH-KB and MCTAB (see Sections 6.1.2 and 6.2.2). The survey and wetland boundary delineation, performed by ACOE staff member Mr. Benton Ching with help of MCBH natural resources staff, followed the 1987 Wetland Delineation Manual. The results are contained in the *Final Report, Wetlands of MCBH, Island of Oahu, Hawaii* (Ching 2002). The jurisdictional wetland boundaries were incorporated into MCBH's Environmental Geographic Information System (EGIS) (see also COA Component Plan 7.7 Resource Information Management) and are shown in Figures 6 and 14, Appendix B. In addition, the reader is encouraged to consult the wetland survey report for more descriptive narratives, tables, photographs, and detailed data points on the hydric soil, water, and vegetation characteristics of each of the wetlands delineated.

With the above information providing a current baseline, the following management actions, which are the same as in the 2001 INRMP/EA, will progress during the next five year implementation period of this updated INRMP.

- <u>HI20004 Wetland Delineation/Mapping/Review and Update.</u>

  In 2002, a comprehensive baseline wetland delineation for all MCBH properties was completed as part of the 2001 INRMP/EA implementation process. MCO P5090.2A, and Federal regulations implementing the Clean Water Act mandate that wetland delineations be reviewed, and updated (as needed) every five years. In addition, a HQMC Environmental Compliance Evaluation on MCBH in February 2006 (TEC 2006) recommended that the wetland delineations—especially for MCBH's isolated wetlands (e.g., Klipper Golf Course wetlands)—be reviewed and updated, as needed. There have been some recent Supreme Court rulings on wetlands that confirm the dynamic nature of the wetland determination process and the need to review wetland delineations on a regular basis.[2]

  A FY2008 effort will review and update the 2002 wetland delineations and make any modifications necessary after field-verification of changes. In FY2013, another assessment will be performed as an additional five years will have lapsed, requiring another review and update as needed. An example of the need to update wetland delineations already, based on changed conditions since 2002, is the completion of HI60834 Wetland Restoration/Percolation Ditch Replacement project in 2006 (detailed under Objective 7.2.3). In that project, the existing percolation ditch delineated wetland (originally size = approx. 0.89 surface acres) was about doubled in size in order to improve its capacity to better absorb excess stormwater runoff from an adjacent military motor vehicle compound and reduce a chronic flooding problem.

- <u>Update wetland GIS boundary layers in EGIS.</u>

  Any future wetland delineation review/updates will be accompanied by a concomitant update in the electronic database files that accompany the survey.

[2] Solid Waste Agency of Northern Cook County v. US Army Corps of Engineers, (SWANCC) (No. 99-1178), decided January 9, 2001. Rapanos v. United States (No. 04-1034) and Carabell v. US Army Corps of Engineers (No. 04-1384), decided June 19, 2006.

- Explore development of cooperative data sharing agreements for GIS layers.[3]

  MCBH EGIS and/or other agency wetland-related GIS layers will be shared and distributed among on- and off-Base agency decision-makers, as appropriate. Data sharing agreements will be implemented, as appropriate.

Objective 7.2.2: Identify wetland threats and implement strategies to address them.

A variety of direct and indirect factors threaten wetland integrity on MCBH properties (see detail in 2001 INRMP/EA). These include those that originate from MCBH activities; activities of adjacent user groups (e.g., off-base property users or owners); and activities affecting wetlands elsewhere in the region with indirect effects on MCBH wetlands. There is a need to continue wetland threat management by working with on-base stakeholders using land adjacent to MCBH wetlands and with off-base stakeholders in the region to identify and address threats to wetland functions and values. Programmed actions to manage threats to MCBH wetlands are listed below:

- Continue invasive plant and animal species control at MCBH-KB wetlands.

  Specific threat reduction actions for invasive animal species at MCBH-KB wetlands (Nu'upia Ponds WMA and other smaller wetlands on Mokapu) are detailed in COA Component Plan 7.1 Fish and Wildlife Management. For invasive plant species, specific threat reduction actions at MCBH-KB wetlands are discussed in COA Component Plan 7.3 Watershed Management, COA Component Plan 7.4 Coastal and Marine Management, and COA Component Plan 7.5 Grounds Maintenance and Landscape Management.

- Expand invasive plant and animal species control to MCTAB wetlands.

  Some of the specific threat reduction actions for invasive plant and animal species at MCTAB wetlands are detailed in COA Component Plan 7.1 Fish and Wildlife Management. This management action focuses on the mangrove encroachment threats at MCTAB, which presently restrict flow, water quality, and wildlife habitat along Waimanalo Stream as well as augment flooding risk upstream and health risks (e.g., stagnant mosquito-breeding waters enhance threat of spread of West Nile, Dengue Fever, and other mosquito-borne human or animal illnesses).

  For example, in 2005, MCBH prepared a CATEX and secured a Section 10 Army COE permit to do mangrove removal along the banks of Waimanalo Stream. A Marine work party from CSSG-3 performed some removal work with hand tools along the stream banks. However, they were only able to make a "dent" in the mangrove infestation. The "core" area of mangrove infestation, with the tallest and largest concentration of mature mangrove trees

[3] Reference to incorporating the latest USFWS wetland classification inventory (from the 2001 INRMP/EA) has been dropped as a separate management action. This is not because it is not relevant, but rather because it belongs as an example under this management action (i.e., MCBH shares its Army COE survey data with other agencies, and, by the same token, other agencies share their data with MCBH). This is now done by request on a case-by-case basis. All parties will likely benefit under an on-going cooperative data sharing agreement, using the most current data. In addition, the management action "Implement developed data sharing agreements, as appropriate" from the 2001 INRMP/EA has been consolidated under this management action.

providing a "seed bank" for constant re-infestation, is in the delineated "Lower Waimanalo Stream Wetland" near the mouth of Waimanalo Stream within the former ox-bow of the stream. In the past, when this oxbow area was clear of mangrove, it hosted numerous Hawaiian waterbirds and other migratory waterfowl (retired USFWS/State DLNR employee, D. Woodside, pers. comm., 2005). This delineated wetland area is within the Air Force's property line for Bellows Air Force Station and therefore within the primarily responsibility of the Air Force to address (see Figure 14b, Appendix B). MCBH will continue to perform opportunistic mangrove clearing efforts in areas of Waimanalo Stream within its boundaries. In correspondence dated September 18, 2006 received from the Chief, Environmental Flight at Hickam Air Force Base in conjunction with MCBH's draft INRMP update review, the Air Force has acknowledged their responsibility for clearing the mangrove in the oxbow area of Waimanalo Stream within their jurisdiction, and have programmed such clearing action into their budget (see reprint of the letter in Appendix G4 for details). The above MCBH and Air Force actions are necessary due to the significant existing threat mangroves pose to the integrity of the healthy functioning of the wetlands and wildlife habitats along the stream, and due to mangrove's contribution to a heightened flooding risk along the stream. Another related issue remaining to be resolved as illustrated in Figure 14b, Appendix B, is to reconcile the property boundary and wetland boundary lines separating Air Force and MCBH jurisdiction in the oxbow area of the stream. As currently depicted, MCBH has jurisdiction over a very small fraction of the jurisdictional wetland in the stream. It would be more practical to align the property boundary line with the wetland boundary line in this location, thus consolidating Air Force's jurisdictional control over the area for future projects they will fund.

- Identify and assist appropriate personnel (e.g., planners, operators) to detect and address threats to MCBH wetlands.

  For example, review comments have been submitted by MCBH natural resources staff to Facilities Department and their contractors currently updating the 1999 MCBH Master Plan to ensure that the updated document contains the latest map of the 2002-delineated jurisdictional wetlands on MCBH properties. When the updated Mater Plan is published with this necessary revision, it will address a deficiency cited during the 2006 Environmental Compliance Evaluation audit that the Base Master Plan does not contain the most accurate and complete map available of jurisdictional wetlands aboard MCBH properties (TEC 2006).

  In addition, natural resources staff have been reviewing Marine Corps Community Services (MCCS) plans to upgrade and intensify uses of MCCS recreational cabins, campground, and marina areas adjacent to several jurisdictional wetlands on Mokapu Peninsula. Environmental comments have stressed the need for MCCS to constrain their designs so as not to adversely impact or encroach upon the delineated wetlands, endangered species habitat, or ecosystem health of these sensitive areas. Environmental review and influence will continue as the final MCCS master plan evolves. This MCCS master plan has not yet been reconciled with the Base Master Plan for consistency and site approval. See also COA Component Plan 7.3 Watershed Management and COA Component Plan 7.5 Grounds Maintenance and Landscape Management for further details on projects programmed to address wetland threats.

- Explore interagency cooperative projects to control wetland threats that transcend Base borders.

  For example, exploratory meetings have begun, involving MCBH with various public and private stakeholders involved in or concerned about mangrove encroachment in Kane'ohe Bay and how it has deleterious effects on Nu'upia Ponds and other wetlands throughout the bay's ecosystem. Interest is growing to develop an interagency mechanism to combine resources to solve this regional problem. (See Section 7.4.1 for further discussion of a project (HI920017M) spawned out of these discussions to further encourage this collaborative approach) As an essential step toward facilitating collaborative cost-sharing of such transboundary projects, a mechanism is needed to administratively facilitate such cost-shared approaches. As a step toward that end, MCBH, via Headquarters Marine Corps, has succeeded in securing DoD funding and approval to join the newly-created Hawaii-Pacific Cooperative Ecosystem Studies Unit (CESU) (see Section 8.3.4 and Appendix G2). The CESU mechanism is a means by which funds among agencies can be pooled for tackling cross-boundary problems such as mangrove encroachment in Kane'ohe Bay, which continue to threaten the ecological integrity of MCBH wetlands. Removing the source of mangrove re-encroachment from off-site areas around Kane'ohe Bay that continue to re-infest MCBH wetlands is tackling the problem at the source, but requires a cooperative regional approach, involving agencies such as the Hawaii DLNR, whose jurisdiction covers Kane'ohe Bay, through cooperative mechanisms, such as the CESU.

- Improve regional capacity to identify factors and forces that encroach on wetlands and develop remedies.

  Contribute to a Ko'olaupoko region-wide need to identify factors and forces that encroach on inherent functions and values of MCBH's wetlands. Do this through continued work to monitor trends cooperatively with off-base stakeholders and to influence control of these threats through various actions or action restraints. For example, in the first five years of INRMP implementation, MCBH made such a contribution by completing the project HI95156 MCBH Hawaiian Stilt Regional Recovery. This project produced a report (Rauzon et al. 2002) that was acknowledged by USFWS in their updated *Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005). The MCBH report goes beyond the USFWS draft revised recovery plan in providing valuable information about existing stilt recovery efforts throughout the region and identifying an ecosystem-based, regional approach to managing stilt habitat. Much of the information compiled in this report and its recommendations for further action at the regional level are being actively reviewed and considered by MCBH throughout the term of this current five year phase of INRMP implementation. The report was favorably reviewed and commented upon during its development by MCBH's Federal and State partners to this INRMP. By providing these partners with copies of the final study, it was intended to be a useful reference to help improve regional capacity among wetland managers to address threats and opportunities that their various wetlands share. The report is expected to serve as a useful regional reference by MCBH's INRMP update partners over the next five years implementation time frame as well, such as in determining jointly-funded endangered species research priorities that would have collective regional benefit.

Objective 7.2.3: Identify and implement wetland enhancement opportunities.

There is a need to continue to work with MCBH planners, operators, and others to pursue MCBH Strategic and Master Plan objectives in such manner as wetland functions and values are enhanced and restored. A number of initiatives of this nature were accomplished in the first five years of INRMP implementation and such efforts will continue. Following are two examples of projects that were largely completed in the first five years of INRMP implementation but shift to a monitoring/assessment phase in the next five years:

- HI60834 Wetland Restoration/Percolation Ditch Replacement

  This project was planned, designed, permitted, and almost completed at the time of this writing, as part of the 2001 INRMP/EA implementation schedule. This project replaced a dysfunctional, weed-choked drainage ditch with a constructed wetland, lined with native plants, in an area draining surface storm water runoff from a combat vehicle maintenance compound. It thus reduced flooding in the adjacent military compound, implemented EPA-recommended BMPs for storm water management, and became a freshwater foraging and loafing opportunity for native and migratory waterfowl. USFWS staff reviewed and concurred in this project during the EA and Section 7 consultation phases (Drigot 2004). In fall of 2006, some additional work at the site is still needed (e.g., to remove a number of extremely large boulders extracted from the excavation site and stockpiled nearby and to complete the one-year landscape contractor's obligation to maintain the newly-installed landscaping prior to turnover to the government (by Jan 2007)).

  Short-term monitoring of project success has already begun. Reduction in flooding of the adjacent vehicle parking lot has been demonstrated during a recent spring period of extremely heavy rains (March 2006). Natural resources staff monitoring documented the successful hatching of one endangered Hawaiian stilt chick from a newly constructed nest within the native plant riparian shoreline of the wetland created during the spring of 2006. The period during which the contractor installed and maintains specified native plant riparian landscaping along the borders of this now-enlarged drainage ditch wetland will end and the project site will be turned over to the government in early 2007. Then, periodic monitoring of wetland conditions on site as the excavated, expanded wetland matures will continue under the direction of MCBH natural resources staff.

  In FY10, the long-term success of this project will be assessed. A rapid biological assessment and water quality sampling will be completed then and findings will be incorporated into follow-on actions in the next update of the INRMP scheduled for FY2011. This is an important performance measure for long-term INRMP implementation success.

- HI80726M Restore Endangered Waterbird Wetlands at Golf Course

  Improvements to three half-acre Klipper Golf Course storm water retention ponds that also serve as endangered and migratory bird habitat were completed and a final project report submitted in 2004, as part of the 2001 INRMP/EA implementation (HDA 2004). They included sediment/weed removal; installation of native plants, solar-powered aerators and an interpretive sign; and pre/during/post construction monitoring of endangered bird activity and native plant establishment around the ponds. Delightfully unexpected increased water bird

use was noted right away. Reduced pond flooding and maintenance was also noted by the Course's "greens" managers. Lessons learned are documented in a University of Hawaii natural resources student Master's thesis (Sudduth 2005) and shared on a 2005 Navy calendar distributed nationwide (see Appendix G2).

In FY08, the long-term success of this project will be monitored by means of a rapid biological assessment and water quality sampling. This evaluation will be done to ensure the pond ecosystem remains healthy, that BMPs are in place, and that maintenance workers are continuing to follow BMPs. Findings of this assessment will lead to further recommendations for improvement. In anticipation of the recommendations from this assessment, a design phase for those improvements is programmed for FY10 and a construction/implementation phase in FY11. Improvements needed may include repeat dredging, control of water lily encroachment in the ponds, upgrade of the aerators in use to improve water circulation, etc.

As seen in the above descriptions, these two projects—largely completed in the first five year INRMP implementation period—will continue to be tracked in the next five year INRMP implementation period as they enter the monitoring/maintenance phase. (Minor numbering changes have occurred in the project titles in some cases, merely to reflect internal changes in numbering conventions used within the USMC).

A new project initiative for wetlands enhancement is programmed for the current five-year phase of INRMP implementation. With the change in uses of the MCBH-KB compound formerly housing the Naval Ocean Systems Center (NOSC) facility by Sag Harbor, various other MCBH units and tenants have been re-located here. The following project is being planned for the area:

- <u>Complete HI0821015M Sag Harbor Wetland Restoration</u>

  This project follows an earlier project in the 2001 INRMP/EA (HI21004 Endangered Species Habitat Improvements/Mangrove Removal) that removed mangrove from various small wetlands on MCBH-KB, including Sag Harbor wetland (Wil Chee Planning Inc. 2002). The Sag Harbor wetland has now been cleared of invasive vegetation, its jurisdictional boundaries have been delineated (Ching 2002), and it has begun to be regularly used by several Hawaiian stilts for foraging and nesting (as documented in bi-annual waterbird surveys, annual Christmas bird counts, and opportunistic surveys by MCBH natural resources staff).

  This project expects to further restore some additional coastal wetland functions by clearing accumulated sediment from the wetland and restoring water circulation with the ocean as when the wetland was created and actively managed during the NOSC occupation of the area. The restoration of natural tidal flow between this coastal wetland and the ocean will also reduce a health threat to nearby users of the area vacated by the NOSC facility (e.g., Waterfront Operations, MCCS recreational users, and temporary tent compounds during large military exercises) by eliminating a currently stagnant water condition that can foster mosquitoes that may carry diseases.

  This restorative management action is compliant with EO 11990 which requires Federal agencies to take action to minimize destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out its responsibilities for managing Federal lands and facilities. MCBH's INRMP requires improving

the health of degraded wetlands.

A FY07 design effort will accomplish four tasks: (1) Test the soil to be dredged from the wetland to ensure there are no potentially hazardous components requiring special disposal or treatment procedures prior to their final disposal or re-use; (2) Dredge the accumulated fill material from the wetland to restore better water circulation (e.g., silt that collected here within the mangrove thicket); (3) Develop a design to remove approximately 30 ft of roadway to a depth of approximately six feet and install best management practices to secure the "cut" from erosion. The removal of the roadway (no longer in use) will allow natural tidal action between the ocean and the wetland as it formerly occurred, to restore the health of the wetland, and create better habitat to support migratory and endangered birds; and (4) Obtain the required Clean Water Act (CWA) 401 and 404 permits and prepare the necessary EA.

Once the EA, design, and, various required permits are in-hand, the FY08 construction phase will (1) Dredge approximately 7500 sq ft and remove approx 840 cu yds of material dumped into the wetland over the years, including the fill used to construct an access road throughout the wetland; (2) Remove approximately 30 ft of roadway and fill material and reinforce the cut to prevent erosion; and (3) Construct a foot bridge over that portion of roadway removed to allow maintenance and monitoring access only.

Objective 7.2.4: Identify and implement wetland monitoring and management activities.

There is a need to develop a more affirmative wetland monitoring and management program at MCBH. An example of a recently completed wetland enhancement project during the first five years of INRMP implementation with a deliberate monitoring component was HI80726 Golf Course Pond/Endangered Waterbird Enhancement. The results of the before/during/after site monitoring of plant changes and bird use are summarized as part of the final report for the project (HDA 2004). In addition, MCBH natural resources staff are programming long-term monitoring studies in FY08 (for Project HI80726M) and in FY10 (for Project HI60834) (see Objective 7.2.3). During the next five years of INRMP implementation, MCBH natural resources staff will continue to implement deliberate and opportunistic monitoring and management activities for projects at various wetland locations as time, staff, and resources allow.

If such systematic monitoring studies as described above are not undertaken, MCBH will not be complying with the ecosystem management principle of performing continuous improvement/adaptive management as mandated in the INRMP. In addition, MCBH's compliance with the Clean Water Act could be challenged if not ensuring that jurisdictional wetlands are properly managed and maintained. MCBH compliance with the Endangered Species Act could also be challenged if MCBH does not demonstrate that the wetlands indicated above continue to provide a healthy habitat for listed endangered bird inhabitants that occupy them.

- <u>Formally assign wetland monitoring and management responsibilities to appropriate personnel.</u>

  Wetland monitoring responsibilities such as those described above are implicit in the current position descriptions of MCBH natural resources staff. However, during the next five year

phase of INRMP implementation, efforts will be made to review the position descriptions of these natural resources staff and see whether any benefits will accrue to developing more formal descriptions of monitoring responsibilities. A more likely scenario, due to in-house staff limitations and the breadth/scope of their other natural resources responsibilities, is that the required systematic monitoring will continue as a function of specifically tasked contactors and/or interns with appropriate training and credentials.

- Ensure assigned personnel obtain focused training on wetland delineation, regulations, and/or monitoring protocols.

  While some environmental staff have received some wetland delineation training, or have basic awareness of wetland regulations and their implications, others have received no training and would benefit by having it. A review of MCBH natural resources and other environmental staff training/knowledge will take place during this five year phase of INRMP implementation to ensure gaps are discovered and training programmed to fill the gaps. In addition, efforts will be made to develop and provide opportunities for other non-environmental MCBH staff who influence wetland impacts (e.g., Facilities planners, military operators, maintenance workers, recreational planners, golf course managers, military police) to receive a level of wetland awareness training relevant to their duties or influences on wetlands. Natural resources staff development of tailored handouts and/or presentations in the awareness classes attended by these other personnel are an example of what has been and can be done, at a minimum, to foster enhanced awareness.

- Explore interagency cooperative projects to implement regional wetland enhancement and monitoring opportunities.

  For example, coordinate MCBH's programmed wetland enhancement and monitoring actions with those in USFWS's *Draft Revised Recovery Plan for Hawaiian Waterbirds* (USFWS 2005).

- Display/distribute *available* wetland presentation materials on wetland resources and management.

  Continue to produce and distribute existing wetland brochures at appropriate forums.

- Develop/distribute *additional* presentation materials on wetland resources and management.

  Develop and distribute additional presentation materials (e.g., brochures, power point presentations, slide shows, and videotapes) to promote wetland awareness.

- Continue established approach (opportunistic) to monitor MCBH wetlands, evaluate results and improve management.

  MCBH's existing wetland monitoring program focuses on project-specific monitoring to ensure its success (e.g., bird response to mangrove removal projects and waterbird use/native plant status for wetland enhancement projects).

- Evaluate and improve (systematically) wetland monitoring methods.

  Develop guidelines for continuing management of restored and constructed wetlands using the cumulative experience of monitoring wetlands during specific projects.

- Develop and apply performance measures to improve effectiveness of wetland resource management.

Objective 7.2.5: Comply with wetland protection laws and regulations.

There is a need to actively monitor the dynamic status of wetland legislation and judicial rulings, and how they might affect Marine Corps policy, MCBH projects, and permitting options. This is an ongoing action on the part of MCBH natural resources staff with the assistance and guidance of Headquarters Marine Corps.

- Clarify jurisdictional status of wetlands when necessary.

  During the 2006 Environmental Compliance Evaluation (ECE) (TEC 2006), a recommendation was made by the natural resources evaluator on TEC's ECE team that the current jurisdictional status of the Klipper Golf Course wetlands (determined in 2002) be reviewed in light of a recent, potentially relevant Supreme Court decision (*Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, 531 U.S. 159). A request to USACOE has been submitted (June 2006) for an updated analysis of the jurisdictional status of these isolated wetlands that are utilized by endangered waterbirds and migratory waterfowl. Since then, another recent Supreme Court decision regarding wetlands has been delivered and the Army COE office has suspended any interpretations on applicability of various permits to certain inland wetland areas until new guidelines are issued (Army COE rep. P. Galloway, pers. comm., July 2006). These developments help demonstrate the dynamic, recurring nature of this required management action and emphasizes the importance of the requirement to review delineated jurisdictional wetland boundaries and adjust if necessary at least once every five years (see Objective 7.2.1, Project HI20004).

- Obtain wetland-related permits (404, 401, 27) as needed.

- Streamline permitting process where possible.

  A recent example of where permit streamlining was accomplished was in the planning/design stages of a watershed restoration project listed in the 2001 INRMP/EA (HI20010 Watershed Repair/Restore, Mokapu Central Drainage Channel (MCDC)), which was awarded for construction in Fall 2006. This project was granted a permit under the new streamlined permitting category known as the Nationwide Permit #27 (Wetland Restoration).[4]

[4] For a definition of this new permit category, see Final Notice of Issuance and Modification of Nationwide Permits, 65 FR 12818, 9 March 2000. See Drigot 2005 (in the Appendix to this EA document) for a copy of the Nationwide Permit #27 that was granted for this MCDC project.

This page intentionally left blank.

7.3 WATERSHED MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

MCBH has made significant strides in adopting a watershed approach, where appropriate, in managing its properties, most notably at MCBH-KB and MCTAB within the Koʻolaupoko region of windward Oʻahu. This is documented in COA Component Plan 7.3 of the 2001 INRMP/EA and in the progress reports made during the first five years of INRMP implementation (see Appendix E2). This track record demonstrates that MCBH is compliant with Federal regulations, and DoD and USMC directives encouraging installations to follow a watershed approach to managing shared natural resources in the regions within which MCBH parcels are located. An updated list of relevant laws, regulations and directives is included in Section 5.1 and Appendix A2. Section 8 demonstrates consistency of MCBH watershed initiatives in relation to other State and Federal initiatives in this subject area. The goal of this component of the updated INRMP reflects a continuation of MCBH INRMP implementation efforts to use an ecosystem-based approach to managing natural resources on MCBH lands, especially on MCBH parcels in the Koʻolaupoko region.

Goal 7.3: Watershed Management

Use an ecosystem-based watershed approach to managing water quality, erosion, and flow/flooding issues on MCBH lands.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.3. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.3.1: Take a watershed approach to characterize and develop solutions to flooding, erosion and other watershed health issues.

Since the mid-1990's MCBH has been systematically incorporating elements of a watershed approach into natural resources and facilities improvement projects, as well as into evaluations of other land use practices at MCBH parcels located in watersheds of the Koʻolaupoko region. In addition, components of a watershed assessment are performed to characterize problems and develop solutions in relevant geographic areas of MCBH. As described in COA Component Plan 7.3.1 of the 2001 INRMP/EA, MCBH is focusing on two major categories of resource management concern – erosion and flooding control – within a watershed context. Several specific projects were initiated or completed during the implementation period of the 2001 INRMP/EA to address erosion and/or flooding and have spawned new

phases or projects during the next five years of updated INRMP implementation. These management actions are listed below and under Objective 7.3.2.

A management action that was completed during implementation of the 2001 INRMP/EA was the ECE-Mandated Erosion Assessment (HI20013). This baseline study (SRGII 2004) reviewed past and present erosion processes at the Landfill and Northeast Crater Catchment area (weapons range interior) of Ulupa'u Crater, as the locations on MCBH parcels needing most immediate erosion assessment attention in relation to the priority of these areas for sustainable uses to support the Base's overall mission and environmental compliance. This review differed from past, inadequate erosion analyses and short-term "fixes" in that it encompassed an interdisciplinary approach, combining perspectives from the fields of fluvial geomorphology, coastal geology, and soil conservation with those from local, historical, managerial and maintenance experience to address the need to sustain multiple vital uses of that area (e.g., weapons training platform, landfill, and red-footed booby seabird colony) for the long term, while reducing likelihood of sediment runoff into the sensitive marine environment offshore of the Crater.

This interdisciplinary effort identified erosion "hot spots" in the landfill and northeast crater catchment areas of Ulupa'u Crater in a watershed context (see Figure 8, Appendix B). It evaluated erosion mitigation methods and recommended site-specific approaches and techniques to be used to resolve some of the most critical erosion problems in these locations.[1] It also recommended appropriate monitoring measures for tracking further erosion processes and effectiveness of ongoing remedies at these "hot spots."

As an outgrowth of the 2004 baseline Crater erosion study, the following INRMP implementation actions were spawned and continue within the next five-year INRMP implementation period[2]:

- HI20013 Sustain Weapons Range-Install Erosion Control BMPs

  This project has the same project number as the completed management action described above. It follows on the findings of that initial baseline study and represents the next phase of an effort to systematically survey, evaluate, and fix erosion problems within the weapons range in the interior of Ulupa'u Crater. The main challenge being addressed in the Crater interior (i.e., the Crater Catchment) area is to design BMPs to reduce the extent of storm water-induced road damage and erosion runoff that makes the weapons range access roads impassable. The outcome of the FY05 funded design solution for the Crater interior (in preparation, NAVFAC HI w/SRGII assist, 2006) is programmed for construction in FY07, while some quick-fix problems have already been remedied.

- HI0920013M Install Erosion BMPS: Crater Slope and Shoreline

  In FY05, MCBH expanded the erosion survey at Ulupa'u Crater to cover the north-facing slopes outside the Crater facing North Beach, and along the Crater's southeast shoreline facing Kailua Bay (SRGII 2006, in prep.). These areas were recommended for follow-on investigation in the baseline erosion survey study (SRGII 2004). The outcome of this assessment will be proposed design solutions to reduce erosion issues for the problems

[1] The landfill erosion fixes are being handled as part of the solid waste management compliance program (Project No. HI073200M Install Landfill Erosion Controls and will not be discussed further in the INRMP update.

[2] The implementation of these follow-on actions constitutes completion of 2001 INRMP/EA management action: "Evaluate and implement appropriate recommendations from the HI20013 ECE-Mandated Erosion Assessment."

identified in these zones. In FY07, funds are programmed to design whatever mitigations are recommended as an outcome of the FY05 phase. In FY09, funds are programmed to construct the design solution developed in the FY07 phase by installing various erosion BMP fixes in the project area.

Without completion of this phased effort, MCBH will have failed to address notable erosion problems that will eventually lead to inoperability of the vital weapons range, landfill, and other valuable conservation and military functions. In addition, unarrested erosion from the landscape may cause Clean Water Act compliance issues with untreated, sediment-laden storm water runoff causing likely adverse impacts in the pristine coral reef ecosystem that exists below the Crater.

- Initiate systematic monitoring of ambient erosion conditions and implement appropriate follow-on actions.

- Develop and apply performance measures to monitor erosion control projects, and make appropriate adjustments.

Objective 7.3.2: Conduct or facilitate restoration activities that enhance watershed health.

There is a need to explore opportunities and develop programmatic means for implementing restoration activities. Currently active and programmed projects as part of the INRMP implementation process are described below[3]:

- Design/Construct HI20010 Watershed Repair/Restore, Mokapu Central Drainage Channel (MCDC).

The Mokapu Central Drainage Channel (MCDC) was constructed in the mid-20th century by incising into fill material placed on the landscape where a previous shallow wetland environment existed. This project is implementing a watershed-based solution to MCDC's impairment problems. It intends to relieve flood risk while restoring other watershed functions along the MCDC. This project replaces a more conventional flood control approach that would have "hardened" stream banks and further degraded the stream corridor's scenic, wildlife, and water quality values.

When completed, this project will replace three acres of invasive weed-choked "fill" land along the channel with a widened, terraced and native vegetated floodplain and restored wetland "pocket" in order to: improve biofiltration of non-point source pollution; mitigate erosion effects; contain floodwaters and increase groundwater recharge; and improve water quality and related conditions conducive to a healthier aquatic habitat for native fish and birds who forage in the channel and downstream Nu'upia Ponds wetlands and Kane'ohe Bay. The

[3] The 2001 INRMP/EA management action "Design/Construct HI10007 Puuloa Range Impact Berm Repair" was completed in 2004. The 2001 INRMP/EA management action "Design/Construct HI32168 Pa'akai Pond/Beach Restoration has been removed from the project list due to other emergent priorities.

resulting modified channel with its restored naturalistic conditions will also provide an enhanced shoreline for recreational use (scenic viewing and walking).

At time of this writing, the detailed design (HPE 2005) and in-house EA (Drigot 2005) have been completed, a USACOE Nationwide Permit #27 (Wetland Restoration) has been secured, and the construction contract has been awarded for this project. Assuming this project is fully executed as scheduled in FY07, it will take several years before the full benefits of this project can be readily observed and evaluated. MCBH has programmed a review/assessment of this project's results in FY12, during the next five year phase of INRMP implementation (starting FY12). In its initial concept design phase (2000-2001) this project received favorable attention by EPA and its partners in the Clean Water Action Plan's publication of a compendium of 30 Watershed Success Stories (EPA 2000) (see Appendix G2). One aspect that was viewed as especially appealing was MCBH's involvement of the public in "planting the vision" of possibilities to take a drab drainage ditch and convert part of it into a more scenic waterway with greater biological diversity, public appeal, and Hawaiian "sense of place."

- Design/Construct HI0835636M Erosion Control/Former Horse Trails, MCBH-CS.

This project at Camp H.M. Smith will repair deeply rutted trails resulting from years of inappropriate horse use on wet forested slopes. An incompatible horse stable operation in the area was closed in the late 1990s. Shortly after that, a watershed and ecosystem management-based remedy was begun with the assistance of National Park Service personnel experienced in this area to repair the damage and recondition the trails for lighter, more suitable use by military conditioning runs and recreational hikers. A redesign was completed with contractor assistance in 2002 in partnership with the State of Hawaii's Na Ala Hele Trail Program manager, incorporating BMP's used by the State for building trails. This design was "shelved" until resolution of a nearby soil contamination problem from an IR program project was completed. That project is now underway, and it is anticipated that completion of the horse trail erosion control project can resume soon. Thus, funds have been programmed to review and update the design in FY07 and then complete construction of the project in FY08. It is anticipated that during the time-frame of the next five year INRMP update (2012-2016), future phases will assess performance of this project by measuring the degree of improvement in environmental conditions and evaluating the effectiveness of measures taken to mitigate erosion, repair the trails and stop non-point source pollution.

- Design/Construct HI20033 MCTAB Watershed Impairment Solution.

This project is part of a long-term phased effort to integrate a watershed approach to evaluating and fixing natural resource management problems at MCTAB. It was preceded by a FY00-funded study of Waimanalo Stream completed as part of the first five-year phase of INRMP implementation (HI20033 MCTAB Watershed Impairment Study (SRGII 2002)). This study provided a number of recommended solutions to the impairment of Waimanalo Stream crossing MCTAB training lands. This follow-on project is programmed during the next five years of INRMP update implementation to develop a detailed design based on some of the watershed impairment solutions recommended in the 2002-completed study and then to implement (i.e. "construct") the final design in the MCTAB portion of the Waimanalo watershed. This project will involve soil excavation and invasive vegetation removal/ replacement with lower-maintenance indigenous plants along various reaches of the channel to restore hydrological functioning, reduce flooding risk, improve aquatic habitat, and provide

more desirable terrain for training. Currently, the detailed design is programmed for development in FY07 and construction is planned for FY09. However, the detailed design and construction phases may be extended in time, based on how long it takes for the required environmental assessment and consultations to be completed, and excavation and Clean Water Act compliance-related permits secured.

In addition to the above-described specific projects, during the next five year phase of updated INRMP implementation, MCBH will continue to expand communication, cooperation, and, to the extent practicable, coordinated planning efforts with other stakeholders in the watersheds wherein MCBH parcels are located. This is necessary in order to avoid adverse impacts resulting from alterations of land and water bodies in other parts of MCBH watersheds. Through such expanded coordination, it may also be possible to leverage the positive impacts of land and water body alterations to the benefit of all impacted stakeholders in the affected watersheds. The following management actions will continue to facilitate interdepartmental, intergovernmental and stakeholder cooperation to enhance watershed conditions in which MCBH parcels are located, in so far as mission, fiscal authorities, and limits allow.

- Continue established approach to voluntary service and outreach in MCBH watersheds.

  See INRMP annual progress reports (Appendix E2) and Outreach Table (Appendix G1) for an idea of the types of volunteer and outreach projects that have already been undertaken and will continue during the next five years of INRMP update implementation.

- Explore interagency cooperative projects to enhance regional watershed restoration opportunities for all stakeholders.

  See INRMP annual progress reports (Appendix E2) and Outreach Table (Appendix G1) for an idea of the types of cooperative projects that have already been undertaken and will continue during the next five years of INRMP update implementation.

Objective 7.3.3: Implement BMPs to improve watershed health.

Best Management Practices (BMPs) need to be incorporated into all flood control, repair, maintenance, and construction activities. Implementation of BMPs is an important step toward recovering natural watershed functions, such as improved water flow and water quality in streams, channels, coastal wetlands and marine waters within which MCBH personnel live, work, and play. BMPs involve, for example, installation or retrofitting of devices to improve storm water retention, reduce flood potential, and increase biofiltration, as well as other approaches to reduce non-point source pollution. The following actions are needed to further refine and expand BMPs in both developed and undeveloped landscapes at MCBH parcels.

- Review and update all relevant plans and SOPs to integrate BMPs.

  This is an on-going process and is the responsibility of all concerned, not just the natural resources management staff under the INRMP. Examples of relevant plans (which undergo

periodic updates on their own timetables but usually at least once every five years) are: Base Strategic Plan (MCBH 2006); Base Master Plan (Wilson Okamoto and Associates Inc. 1999—now being updated (BCH 2006, in prep.)); MCTAB Master Training Plan (Group 70 2002); Storm Water Pollution Prevention Plan (HPE 2001); and Pollution Prevention Plan (NAV FAC Pacific and NFESC 2000). The INRMP implementation staff is regularly queried to consciously review/comment on various plan updates to ensure that INRMP-related BMPs are incorporated in appropriate projects.

Project examples include: tear down/rebuild housing; parking lot drainage improvements; unimproved road repair; vegetation clearing; riparian vegetation installation in drainage swales; and repair of dirt berms in training areas. There is an on-going process of natural resources staff review of projects for these types of environmental compliance concerns when the project proponent submits the environmental documentation of the project for review by the Environmental Department and others as part of compliance with NEPA. This provides the opportunity to check the projects (most of them non-INRMP projects) to ensure they are implementing watershed BMPs where appropriate. A recent example of how this review led to the completion of a project that recommended appropriate BMPs to military operators for dirt berm maintenance and repair is documented in the following report completed during the first five-year INRMP/EA implementation period: *Erosion Control Design/instructions for Range Berms within Ulupa'u Crater, Final Report* (SRGII 2005).

Objective 7.3.4: Incorporate BMPs into guidelines, operating, and evaluation procedures.

There is an on-going Base-wide need to continue to build management capacity to implement BMPs throughout MCBH departments and tenant organizations by updating and developing appropriate guidelines and SOPs and evaluation measures for assessing operational results. Implementation of BMPs will be facilitated if management personnel responsible for incorporating BMPs into Base guidelines, SOPs, and projects are properly identified and carry out these responsibilities. The following management actions are on-going by natural resources staff responsible to coordinate implementation of the IRNMP and support this objective:

- Identify and assist appropriate personnel to incorporate relevant BMPs into operational guidelines and SOPs.[4]

  Relevant guidelines may include: aircraft and tactical vehicle wash procedures; club-organized volunteer fund raising car wash procedures; repair and maintenance of dirt berms in relevant locations. Recently, for example, MCBH natural resources staff arranged the funding of a technical guidance study by watershed science/erosion control experts for the benefit of G-3 military operators who wanted to repair berms at the Ulupa'u Crater weapons range using available fill from a non-optimal, but readily available source. The final report provided specific guidelines on types of cover materials and BMPs to employ if the available, non-ideal fill is used to construct or repair berms at the Range to help regulate erosion rates. A recommended materials list and cost estimates were also provided for appropriate follow-

[4] The management action "Develop and implement appropriate BMPs into contract SOWs, Plans and Specifications, as appropriate" from the 2001 INRMP/EA has been consolidated under this management action.

on action (see SRGII 2005, *Erosion Control Design/Instructions for Range Berms Within Ulupa'u Crater, Final Report* for further details). In this manner, MCBH natural resources staff help develop and implement appropriate BMPs into contract SOWs, plans and specifications, as appropriate.

- Develop and apply performance measures to document effects of implementing BMPs, and make appropriate adjustments.

  Benefits may include: labor savings, cost avoidance and reduction.

Objective 7.3.5: Ensure adequate awareness building and training about BMPs, watershed health and water quality.

Implementation of BMPs will be facilitated by ensuring training and awareness for appropriate operational, residential, and outside stakeholder personnel. The following management actions will be on-going throughout the next five year INRMP update implementation period to help achieve this objective:

- Formally assign watershed management and assessment responsibilities to appropriate MCBH personnel.

  Review and recommend updated training for appropriate MCBH personnel to ensure they understand the latest watershed management and assessment policies, regulations, and techniques as appropriate.

- Ensure relevant personnel obtain focused training on watershed BMPs.

  For example, two appropriate audiences for such training attend the Environmental Department SOP class and New Arrivals Base Briefs.

- Display/distribute *available* presentation materials on watershed health, assessment and BMPs.

- Display/distribute *additional* presentation materials on watershed health, assessment and BMPs.

This page intentionally left blank.

7.4 COASTAL AND MARINE RESOURCES MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Ship-to-shore training maneuvers at coastal areas of MCBH properties (e.g., MCBH-KB at Mokapu Peninsula and MCTAB at Waimanalo Bay) are crucial to enhancing military readiness, a key objective in the MCBH Strategic Plan (MCBH 2006). A major category of military readiness depends on being able to conduct "forcible entry from the sea."

Sustaining ability to train in the littoral zone is complicated by the fact that MCBH also has significant natural resources stewardship management responsibilities within the coastal marine zone in this area. For example, along approximately 11 miles of coastline at MCBH-KB, over 50 different species of waterbirds, migratory shorebirds, and seabirds have been noted in 50 years of bird count records (see Appendix C). One of them (*Puffinus pacificus*, wedgetailed shearwater) has established a breeding colony in sand burrows along Fort Hase Beach and a World War II-era earthen berm near Pa'akai Pond in the Nu'upia Ponds WMA, not far from USMC amphibious landing areas (see Figure 10c, Appendix B). A representative variety of Hawaii's unique native sea strand vegetation occurs along the shoreline (Herbst 1999). The offshore maritime ecological zone within MCBH-KB's littoral area includes coral reef, benthic and pelagic areas, their associated marine species, and other more transitory species, including endangered humpback whales, endangered Hawaiian monk seals and threatened green sea turtles in adjacent Bays and/or open ocean environments. Hawaiian monk seals regularly come ashore on MCBH-KB's beaches to rest and, on one occasion (1996), a pregnant female gave birth and successfully raised her pup.[1] These littoral and offshore coastal and marine resources are further described in Section 6, Existing Environmental Conditions.

The extensive geographic scope of MCBH's coastal and marine resources' responsibility is located primarily at Mokapu Peninsula (MCBH-KB), but also encompasses approximately one mile of Waimanalo Bay's coastline at MCTAB, and about 0.6 miles of coastline at the Puuloa Training Facility. MCBH-KB's primary coastal and marine resource responsibilities extend seaward from Mokapu Peninsula's shoreline out to 500 yards (see Figure 4, Appendix B). This 500-yard buffer zone around Mokapu is policed in such manner that any boats are subject to inspection by military police, conservation law enforcement officer, or waterfront operations harbor patrol personnel at any time without notice. Commercial fishing is unauthorized unless approved by the Commander, Naval Base Pearl Harbor, Hawaii. Only active duty military personnel and MCBH civilian employees may boat in the 500-yard buffer zone. All others, including visitors at the MCBH Marina, must receive approval from the Commanding General. Any request for entrance into the 500-yard buffer zone exceeding 30 days will be forwarded to the Commander, Naval Base Pearl Harbor, Hawaii for approval. Within that zone, MCBH claims control to all access and resources found within the water column and benthic areas.[2] MCBH also has responsibility to police and manage any adverse impacts of its military training, recreational, construction, or other activities on shoreline features, and processes and marine natural resources found in this zone, as well

[1] Suitability of MCBH-KB shorelines for Hawaiian monk seal use had already been demonstrated in 1992 when MCBH hosted a National Marine Fisheries Service emergency project on this same 1996 birthing beach to restore health of several captured emaciated female monk seal pups prior to re-release to the wild near French Frigate Shoals (their place of birth) (Drigot, personal knowledge/involvement in these projects; MCBH Files).

[2] Authority is found at 18 USC 1382 and Executive Order 8681 of February 1941. See Base Order P5500.15B for further discussion of buffer zone access rules and regulations.

as in the marine areas affected during amphibious transits between MCBH-KB and MCTAB, or during ship-to-shore maneuvers at MCBH-KB and MCTAB.

One of the Federal laws affecting coastal Marine Corps activities is the National Coastal Zone Management Act (CZMA). Under this Act, MCBH is required to conduct its marine coastal activities in a manner that is consistent with the State's Coastal Zone Management Program "to the maximum extent practicable" (see Section 8.2.2). In particular, recent guidance focuses on the development and implementation of coastal non-point source pollution control programs (see Section 8.3.2).

Another component of MCBH's coastal and marine resources management responsibilities focuses on coral reefs. Although actual coverage of coral may be less than ten percent in the MCBH-KB 500-yard buffer zone (Henderson 1992), coral reefs are the most prominently regarded marine ecosystem types in the region. The Hawaiian Archipelago is one of the most isolated landmasses on Earth (Juvik and Juvik 1998, op. cit., in Shafer et al. 2002)). Hawaii's marine phyla are categorized as a separate eco-region because its marine life is so distinct from the rest of the Indo-Pacific Ocean (Clark and Gulko 1998, op. cit., in Shafer et al. 2002). A similar ecological situation exists for Hawaii's land-based organisms (e.g., geographic isolation, infrequent arrival of new organisms, low rates of genetic exchange with outside marine areas, low biodiversity and high endemism). The Kane'ohe Bay coral reef ecosystem is considered one of the most unique and scientifically valued in the world. Kane'ohe Bay is the only bay in the entire Hawaiian archipelago that contains all three types of reefs: patch, barrier, and fringing (D. Gulko, pers. comm., 2006 and Shafer et al. 2002). In recent decades substantial improvements in water quality and protection have resulted in improved conditions of these reefs. Degradation has been partially controlled by that fact that Kane'ohe Bay is zoned "AA" under the State's Water Quality Standards, the most pristine standards in the classification system. New point-discharge permits into the bay are virtually impossible to attain and existing permits are stringently monitored. Concern for impact on coral reefs is one of the reasons. However, environmental conditions are dynamic and there are recently intensified sources of marine threats (e.g., alien marine species invasions) that are posing renewed challenges to resource managers concerned with controlling habitat degradation for these unique reef ecosystems.

MCBH's increased focus on coral reef ecosystem management is heightened by the facts that: (a) EO 13089 directs Federal agencies in the protection of coral reefs (see Appendix A2); (b) Hawaii contains a majority of US coral reefs; (c) MCBH is the only US Marine Corps installation with coral reef ecosystems within its management jurisdiction[3]; (d) the coral reef ecosystem of Kane'ohe Bay adjacent to MCBH-KB is unique and scientifically important; and (e) two fairly recent, high visible mishaps concerning groundings of Marine Corps (AAV) and Navy (LCU) vessels on coral reefs occurred during training maneuvers in the vicinity of MCBH properties (MCBH-KB and MCTAB). As a result of this needed emphasis, a set of coral reef ecosystem management actions were completed or initiated during the first five years of INRMP/EA implementation and are continued in this Coastal and Marine Resource Management component of the updated INRMP. See Objectives 7.4.2 – 7.4.3 for further details.

[3] The National Action Plan to Conserve Coral Reefs identifies impacts of military activities as being potentially adverse and concludes that "...every military installation whose operations may affect a coral reef ecosystem must prescribe and include protective measures in the installation's Integrated Resources Management Plan" (US Coral Reef Task Force 2000).

Another major category of MCBH's coastal and marine resource management concern is the presence of mobile fish and wildlife including native fish and shellfish stocks; fish stocks particularly important to commercial, subsistence and sports fishermen; and native marine invertebrates, mammals, and reptiles, some with endangered or threatened status (i.e., humpback whales, Hawaiian monk seals, and green sea turtles). (See Appendix C for a list of known marine species of protection concern in MCBH marine waters). In addition to well-established protection concerns arising from applicability of the Endangered Species and Marine Mammal Protection Acts, there is new Federal emphasis on protecting Essential Fisheries Habitat (EFH). Some EFH's fall within the MCBH coastal zone of jurisdiction as designated under terms of the 1996 reauthorized and amended Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Thus, EFH's for several fish species complexes (e.g., adult and juvenile bottomfish, eggs and larvae) and crustacean species assemblages (e.g., juvenile, adult, and larvae of spiny lobsters) are found in waters around pertinent MCBH coastlines (pers. comm., NMFS rep. A. Everson, 2001; Western Pacific Regional Fishery Management Council 1998). Any Federal action that might have an adverse effect on quality and/or quantity of EFH's is subject to consultation requirements with NOAA Fisheries under section 305(b)(2) and 305(b)(4)(B) of that Act. EFH conservation recommendations provided by consulted Federal or State agencies pursuant to section 305(b)(4)(B) of the Act must be considered. Up until the implementation of the 2001 INRMP/EA, MCBH-KB had performed only two recent, but limited surveys of marine fisheries resources within its coastal and marine jurisdiction in recent years (Brock 1994, Henderson 1992). There is need to expand and improve MCBH's inventory of known fisheries, shellfish, marine mammal and reptile (turtles) resources within its coastal zone. This will ensure proper compliance with new consultation requirements under the Magnuson-Stevens Act as well as under the already-established Endangered Species Act and Marine Mammal Protection Act requirements. Efforts to satisfy this need began during the first five years of INRMP implementation, and continue in the next five years as reflected in the list of programmed management actions in Objective 7.4.2.

A final major category of MCBH's coastal and marine resources management concern to be addressed is marine threats, both direct and indirect, human and natural in origin, that presently or potentially affect MCBH's military readiness and natural resource conservation programs. Examples of threats are: (1) oil and hazardous substances spills and associated potential adverse consequences to marine coastal resources and military training activities; and (2) uncontrolled advance of alien invertebrate and plant marine species, especially the known invasives that are already impacting coral reef ecosystems of Kane'ohe Bay including: mangroves (*Rhizophora mangle*); several species of invasive, alien red algae with plastic morphology and high growth rates (e.g., *Kappaphycus striatum* and *K. alvarezii*); and invasive jellyfish species (e.g., *Cassipoea andromeda* or upside-down jellyfish) with their stinging cells or nematocysts. These alien species threats and impacts are further described in Section 11.2 of the *MCBH Coral Reef Ecosystem Management Study* (Shafer et al. 2002).

Goal 7.4: Coastal and Marine Resources Management

Use an ecosystem-based watershed approach to manage and enhance shoreline and near-shore marine resources within MCBH control and/or use.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.4. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for

each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.4.1: Improve inventory and conditions of biological and geophysical processes and features in MCBH littoral areas.

There is a need to continually improve the inventory of littoral biological and geophysical features, processes, and conditions by consolidating existing and expanding baseline data on shoreline geophysical features and processes in MCBH's coastal zone. Collaborative, focused surveys with Sikes Act partner agencies are the preferred approach. The following similar management actions continue as in the 2001 INRMP/EA:

- Continue CZM Consistency/Shoreline Determination Improvements.

  In the first five-year INRMP implementation period, MCBH completed HI10007 Puuloa Range Impact Berm Repair, which involved coordinating a required shoreline certification with the State and completing the necessary CZM consistency determination to acquire a permit for emergency erosion mitigation on the back side of the Puuloa Range impact berm along the eroding marine shoreline. The project involved design modifications to the berm to improve access to its steep sides for future repairs. It also stabilized erosion on the adjacent shoreline by establishing largely native vegetation ground cover. In the next five year implementation period of the updated INRMP, MCBH will continue to refine its screening procedures to ensure all relevant projects are subjected to the CZM consistency determination process. See Objective 7.4.5 for additional information.

- Initiate systematic monitoring of ambient shoreline and off-shore erosion conditions and implement appropriate follow-on actions.

  No recent systematic assessment of shoreline erosion or offshore littoral movements of sand and sediment as it influences MCBH-KB shoreline features has been conducted, although opportunistic monitoring is on-going as specific erosion problems are noticed and addressed. The last systematic assessment was in 1989 (see Gerritsen 1989). MCBH lacks a monitoring system for tracking seasonal and human-induced changes in MCBH shorelines at known highly-dynamic areas such as Ulupa'u Crater shoreline, Pyramid Rock and Fort Hase Beaches on MCBH-KB, and Puuloa Training Facility shoreline. Lack of this kind of data has hampered the ability to design and maintain effective structures and/or mitigation actions for military training (e.g., berms at Puuloa Training Facility and at FBI Range, Ulupa'u Crater) and shoreline recreational activities (e.g., erosion along the coastline at MCBH). However, several recently undertaken management actions are addressing this problem. Limited assessments of such phenomena have recently been conducted in connection with several site-specific shoreline erosion-mitigation projects over the past two decades (Gerritsen 1989 and Ogden Environmental and Energy Services Co. Inc. and Environmental Center,

University of Hawaii 2000). Other erosion assessment and erosion repair projects, including some shoreline areas, are in progress as further described in COA Component Plan 7.3.1 Watershed Management. MCBH properties include approximately 12.5 miles of shoreline, some more erodible than others. There will always be some form of monitoring (opportunistic or systematic) of MCBH shorelines and implementation of site-specific erosion repair projects where most needed in the years to come as a component of the INRMP implementation program. Such projects will mitigate against future problems in the marine coastal zone.

- Evaluate and implement appropriate recommendations from the HI20009 Coral Reef Ecosystem Management Study.

During the past twenty-five years, MCBH (and the former MCAS-KB), carried out a few of its own baseline surveys or was host to various project-driven baseline studies of marine aquatic life within areas of its jurisdiction. These surveys and studies were conducted in MCBH's Nu'upia Ponds coastal wetland/fishpond complex (AECOS Inc. 1983, 1985a, 1985b; Brock 1994); in the Mokapu Central Drainage Channel (as part of the preparation of the *Mokapu Manual for Watershed Health and Water Quality* (Wilcox et al. 1998)); in waters within the 500-yard seaward buffer zone around Mokapu Peninsula (Henderson 1992) and as a required component of environmental assessment work in conjunction with specific projects carried out in the 500-yard seaward buffer zone around Mokapu Peninsula.

In the first five year implementation time frame of the 2001 INRMP/EA MCBH funded a HI20009 Coral Reef Ecosystem Management Study (CREMS), completed in 2002, which pulled together a comprehensive summary of information found in these previous studies and surveys as well as from others covering the entire Ko'olaupoko region of MCBH's marine jurisdiction and influence. By evaluation of these secondary sources, the CREMS identified what is known about the current condition of coral reef ecosystems within MCBH's jurisdiction; summarized uses, impacts, access, and other demands of stakeholders that pose threats to these ecosystems or to MCBH's use of these areas for military purposes; summarized findings and managements concerns; and provided a list of recommendations for future management activities to be carried out to continue to address INRMP coastal and marine goals and objectives (Shafer et al. 2002). This study, its analysis and recommendations for follow-on work, have and will continue to be a valuable guide to resource management projects carried out throughout the next five year updated INRMP implementation period. It was reviewed and concurred in as being an excellent resource and management guide by USFWS, State Division of Aquatic Resources, and NOAA Fisheries staff.

- HI20009 Inventory/Improve Management of Marine T&E/Invasive Species in MCBH Waters.

In FY03, USMC funds were requested by MCBH natural resources staff and became available to implement one of the priority recommendations in the CREMS—to perform the first comprehensive marine survey within MCBH's 500-yard seaward security buffer zone since the 1992 Henderson survey. In keeping with MCO P5090.2A Section 11104.3 that states "when contracting fish and wildlife work, priority will be given to Federal, State, and local agencies having responsibilities for the conservation and management of fish and wildlife," MCBH used funds acquired from Headquarters Marine Corps to hire USFWS staff to coordinate this interdisciplinary, interagency study to be performed primarily by an experienced team of marine scientists from Federal and State agencies, and several from

private (Oceanic Institute) and public institutions (University of Hawaii). This interdisciplinary marine biologist team had already worked together in the Northwestern Hawaiian Islands and/or elsewhere in Hawaiian waters to perform Rapid Ecological Assessments of coral reef ecosystems. Completion of this project has experienced several delays, but is expected to be complete by the end of CY06. When completed, this effort will produce an updated inventory of marine resources occurring in the 500-yard seaward marine buffer zone surrounding MCBH Kaneohe Bay. As of November 2006, the field work phase is almost completed (after experiencing various logistical, weather, and staff availability delays). Finalization of field work and submittal of the final report is pending as of November 2006 (USFWS K. Foster, pers. comm., 2006). Since the report was not available for consideration before the deadline of this INRMP update, MCBH intends to consider the findings and recommendations of this report in future INRMP progress review and annual update efforts. Preliminary noteworthy findings gleaned from partial progress reports submitted at time of this writing have been incorporated into an update of the marine species list in Appendix C. See Figure 9, Appendix B and a companion preliminary list of survey findings at the eleven study stations visited within the 500-yard seaward security buffer zone around Mokapu peninsula. Highlights include the discovery of a native sea grass meadow not previously known in Kane‘ohe Bay—supporting rare sea horses and threatened green sea turtles. The lead USFWS biologist on this survey noted MCBH waters rival “some of the best sites within the Northwestern Hawaiian Islands” (K. Foster, pers. comm., 2006). Significant cost savings were achieved in marine field survey execution through boating support assistance from MCBH’s military waterfront operations personnel in coordination with MCBH natural resources staff.

When the USFWS-led marine survey and report is completed, MCBH will assess the results in FY08, and by FY09, MCBH will design and implement appropriate follow-on INRMP management actions. In the meantime, any actions identified before then requiring more immediate attention will be completed along the way, if feasible within the available level of resources. MCBH will expect collaborative support from Federal and State Sikes Act partners to the extent possible in implementing these actions (e.g., from USFWS and NOAA Fisheries marine biologists, as well as DLNR/DAR personnel).

By FY11, funds are programmed to take the cumulative results of new information from the updated marine survey (USFWS 2006, in prep), and outcomes of follow-on management actions completed in FY08 and FY09 into account when completing the next five-year updated INRMP due in 2011. Additional management actions will be programmed into that updated INRMP, based on a situational analysis of what is necessary at the time.

- HI0920017M Invasive Mangrove Remove-K-Bay Shoreline

This project was begun with FY05 funds, partly as an outgrowth of exploratory meetings involving MCBH with various public and private stakeholders about mangrove encroachment in Kane‘ohe Bay and how it has deleterious effects on Nu‘upia Ponds and other adjacent wetlands throughout the Kane‘ohe Bay ecosystem. These meetings are mentioned under COA Component Plan 7.3.2 of this updated INRMP, in connection with MCBH efforts to facilitate a cooperative conservation effort and funding approach involving multiple stakeholders that are already, but separately, involved in removing mangrove from various sites around Kane‘ohe Bay.

A contractor has been retained (AECOS Inc. 2006) to help develop a collaborative approach and preliminary cost estimates to remove several acres of thick invasive mangrove infestation in Kane'ohe Bay near the MCBH H-3 Main Gate in a manner that has minimum environmental impact and confirms the role of State agency cooperators (since the mangrove to be removed is on State-submerged lands). This project is necessary in order to reduce water quality degradation and security threats to MCBH and protect resources under MCBH jurisdiction. Current mangrove infestation in the southern end of Kane'ohe Bay is degrading bay water quality and aquatic habitat. It causes sediment build up, restricts tidal water circulation and fish movement in and out of Nu'upia Ponds (a protected endangered bird habitat, wetland, historic fish pond complex, and security buffer for MCBH). It also provides a seed bank for mangrove to re-infest Nu'upia Ponds, thus eroding gains made by a $2.5M investment over the preceding 20 years to successfully remove it from the ponds. The mangrove infestation also poses a physical security risk and enforcement burden for MCBH, as it has provided "cover" for poachers of protected marine life, drug dealers, and potential terrorists. Stagnant, mangrove-choked waters encourage algae blooms and sediment build-up, cause noxious odors, enhance flood risk, and enable invasive species encroachment onto unique coral reef ecosystems of the bay. The project study report from this effort is expected in November 2006.

A FY07 follow-on project has been programmed to design whatever recommended action/approach emerges from this study to remove the mangrove shoreline infestation along Kane'ohe Bay and prepare/secure the required permits/EAs/consultations required. Based on the FY07 design and related conditions, a FY09 phase of this project will construct/implement the project to remove this mangrove shoreline infestation. Partnering with Federal and State agencies whose resources will be affected is essential since the effort will involve marine resources outside MCBH's direct jurisdiction or control. The project will have benefits that transcend jurisdictional boundaries and help improve the health of the larger Kane'ohe Bay ecosystem. The State of Hawaii's Aquatic Invasive Species Management Plan has favorably cited MCBH's mangrove removal initiatives thus far as a significant military contribution to restoring regional ecosystem health (Hawaii DAR/DLNR 2003). National non-governmental organizations have also acknowledged this contribution as positive.[4]

Objective 7.4.2: Identify impacts and threats to MCBH coastal and marine resources.

There is a need to periodically implement an updated marine resources threat inventory and assessment by utilizing experienced resource manager judgment, selective field gathered data, and literature review from MCBH, Sikes Act partners and other sources to identify and assess relative impacts and threats of military or other activities on conditions of shoreline and offshore coastal and marine natural resources. In a climate of shrinking staff and budgets, it is extremely important to carefully plan restoration or avoidance measures or mitigation and monitoring measures based on evaluating relative significance of various impacts and threats to marine resources. Threats or stresses are both human-caused and natural in origin. They include physical, biological, or chemical agents or changes in the coral reef environment, with the potential to negatively impact and degrade resource values. While the evaluation

[4] See National Wildlife Federal publication "Under Siege: Invasive Species on Military Bases" (Westbrook and Ramos 2005), excerpted in Appendix G2.

should focus within MCBH jurisdiction and near-shore marine transit routes, it should also consider the relative influence of external threats resulting from ecosystem-level processes in the larger region. Threats to coastal and marine resources and training activities can be placed into at least three categories: military activities, other direct stakeholder activities (e.g., boating, fish harvesting); and indirect stresses or influences of natural and/or human origin (e.g., alien mangrove encroachment, other marine invasive species invasions).

Spill risk is one of the most significant threats that MCBH must mitigate (see Objective 7.4.2, 2001 INRMP/EA for details). MCBH manages oil spill risks as a part of its Natural Resource Trustee Responsibilities (see Section 8.1.11). The following management actions are programmed for more effective MCBH compliance with Natural Resources Damage Assessment (NRDA) and spill response obligations:

- Inventory available maps/databases about coastal and marine resources/spill risks in MCBH coastal areas, and integrate into MCBH EGIS.

  This data can be obtained from NOAA Fisheries, State DLNR, University of Hawaii and other sources. Disseminate the results to responsible staff and agencies involved both on- and off-base in complying with NRDA and spill response management obligations. See also COA Component Plan 7.7 Resource Information Management.

- Formally assign NRDA responsibilities to appropriate personnel.

- Ensure assigned personnel obtain focused training on NRDA responsibilities.

- Review and update existing MOUs about NRDA actions with Sikes Act partners and other agencies, as appropriate.[5]

Other threats, including those presented by military activities, internal and external stakeholder activities, and other factors, need to be periodically inventoried and evaluated. For example, there needs to be a better inventory of alien species present in MCBH jurisdictional coastal zones; and to evaluate the extent of their threat to protected marine natural resources, military uses, and recreational/quality of life activities. A deliberate attempt is needed to predict occurrences of such threats through an analysis of likely vectors (e.g., ship travel patterns and contribution of military amphibious exercises to those patterns). For example, ballast water from maritime vessel transportation has been documented to be the single most common mechanism by which introduced species are transported around the world. Yet, the transdisciplinary need to study interrelationships between marine alien species distribution and shipping patterns/trends remains neglected even though it holds promise to help increase the predictability of threat spread and the ability to plan and implement better management and control options.[6] There is a need for MCBH to identify its own marine traffic patterns; assess possible vessel vectors for alien marine species introductions; and develop an action plan to minimize transport contamination risk from sources under MCBH control. The following action is being programmed to address these and other marine threats:

[5] See available guidance such as NOAA's *Damage Assessment Guidance Manual* (NOAA 1997).
[6] Carlton, James T., noted marine alien species expert, presentation on "The Big Picture on Global Marine Invasions and Why We Care," at *Marine Aliens Workshop*, A Workshop at the University of Hawai'i, May 18, 2001 sponsored by grants from the Packard Foundation and the USFWS to the University of Hawai'i and Bishop Museum.

- Identify and assist appropriate personnel (e.g., planners, operators) to detect and address threats to coastal and marine resources.

  Inventory marine threats, such as alien species invasion, and produce an ecosystem-level characterization of their relative influence on the military mission and overall health of the resources affected. Through consultations with military operators, resource management agencies, and stakeholder user groups, compile, characterize, and categorize these threats by relative significance to military readiness as well as to MCBH resource conservation missions. Recommend appropriate management responses to mitigate these threats. For example, an appropriate response to alien species invasions might be the adoption of specific protocols for washing down military equipment before and after each transport.

Objective 7.4.3: Plan restoration, avoidance, mitigation or monitoring activities on MCBH coastal and marine resources.

There is a need to implement risk management by utilizing experienced resource manager judgment, selective field gathered data, and literature review from MCBH, Sikes Act partners and other sources to help plan restoration, avoidance, mitigation or monitoring activities as appropriate (see Objective 7.4.3, 2001 INRMP/EA for details). Application of ecosystem-based ecological risk assessments (ERA) to natural resources management decision-making situations is relatively new for MCBH. A recent application of ERA was carried out to support decision-making for a MCBH proposed action to mitigate potential coral reef damage from various potential releases of Ansulite Aqueous Film-Forming Foam in the near-shore southern region of Kane‘ohe Bay (Belt Collins Hawaii 1996). Its purpose was to evaluate potential effects of release of this substance at the ecosystem-level of MCBH-KB and to present containment alternatives to mitigate these risks and associated threats or hazards which would otherwise jeopardize the health of surrounding coral reefs of Kane‘ohe Bay. The following next steps are programmed to integrate ERAs into MCBH natural resources management in the next five years of INRMP implementation:

- Review and update established MCBH policies and practices regarding ERA for potential expansion to coastal and marine resource management.
- Ensure assigned personnel obtain focused training on ERA methodologies.
- Develop and apply performance measures for the application of appropriate ERA methods to coastal and marine projects.

Objective 7.4.4: Improve implementation of policies, guidelines, and procedures on shoreline and offshore coastal and marine resources.

This section addresses the need to increase awareness and integration of issues related to management of coastal and marine resources with other base activities, including training, facilities management, and recreation. There is a need to ensure compatibility between MCBH program policies (e.g., Facilities, MCCS, G-3) and marine resource conservation policies and initiatives, where possible, thus meeting both military mission and environmental protection goals. There is also a need to build management capacity throughout MCBH by updating appropriate base policies, guidelines and procedures.

- Incorporate updated coastal and marine resource management policies into Base Plans, Projects and Protocols.

  Identify and work with appropriate personnel and divisions to review department instructions, SOPs, and proposed projects, looking for areas of potential incompatibility needing adjustment. When compatibility issues arise, develop necessary point papers, memoranda, and recommended changes in instructions, SOPs, and project designs to resolve the issues.

- Develop a Sustainable Marine Access Policy and disseminate to stakeholders.

  MCBH receives many unsolicited proposals to use MCBH coastal and marine space and/or resources for various natural resource development and evaluation projects. The decision-making criteria used to evaluate and determine relative merits of these proposals in relation to established policies regarding access, military readiness, and natural resource conservation are often not fully understood and appreciated by the proposers. MCBH needs to clarify and publish clear statements on its access policies and how factors such as environmental sensitivities, security concerns, equity issues, and maintaining military flexibility play a role in the review process.

- Monitor recreational use of MCBH's marine coastal zone (systematically), evaluate results and improve management.

  See COA Component Plan 7.6 Outdoor Recreation, Quality of Life, and Outreach Management for further details.

Objective 7.4.5: Improve awareness and training on coastal and marine resources.

There is a need to ensure appropriate training and education in NRDA, ERA and/or marine resources for both operational and residential personnel. This may be accomplished by improving ongoing educational, volunteer, and outreach activities to make them more effective. Management actions planned toward that end are:

- Formally assign coastal and marine resource management responsibilities to appropriate MCBH personnel.

- Ensure assigned personnel receive appropriate training in marine resource management, enforcement, and related subjects.

  For example, in May 2001, MCBH natural resources staff received training on proper response to oiled wildlife during a cooperative workshop on disentangling whales from drift nets. Such training opportunities need to be more systematically planned and carried out.

- Display/distribute *available* presentation materials on coastal and marine resources.

  For example, this is routinely done via power point slides, information brochures, and other handouts as part of New Arrivals and SOP briefs, and informational displays at special educational events such as at MCCS's annual "Day at the Dock" fishing derby for kids at the Base marina (see Progress Reports in Appendix E2 and Outreach Table in Appendix G1 for details).

- Develop/distribute *additional* presentation materials on coastal and marine resources.

  For example, have an improved marine environment module including informational displays at the Base Marina and recreational cabins and other places where coastal and marine resources are enjoyed (e.g., the annual summer Base open house during Bay Fest). These expanded efforts would help to generate more awareness on proper conduct around sensitive coastal and marine resources within MCBH jurisdiction.

Objective 7.4.6: Optimize interaction with regional stakeholders to address coastal and marine conservation impacts and opportunities.

Because most threats and effects on coral reefs, even within MCBH jurisdiction are regional in nature, MCBH can leverage its limited resources by collaboratively developing marine conservation projects in the Ko'olaupoko region with other stakeholders. The intended approach is to identify and track outside agency marine resource conservation initiatives and focus limited resources on identifying, leveraging, and implementing collaborative opportunities that enhance both MCBH's military readiness and marine natural resources conservation missions. The following management actions are planned:

- Explore interagency cooperative projects to manage threats to MCBH's coastal and marine resources.

  Agencies may include: NOAA Fisheries, USFWS, State DLNR, non-profit environmental organizations, and other appropriate stakeholders. For example, in June 2006, NOAA Fisheries and MCBH natural resources staff performed a cooperative, coordinated effort to remove marine debris off MCBH shorelines and near-shore areas in Kane'ohe, Kailua, and Waimanalo Bays as part of NOAA Fisheries regional effort. In July 2006, another cooperative effort with NOAA Fisheries, scouting organizations and other on- and off-base

volunteers was carried out along MCTAB beaches in Waimanalo to remove marine debris accumulation that had piled up in excessive amounts after an unusually rainy period in March.

- Explore interagency cooperative projects to implement regional coastal and marine conservation opportunities.

  In addition to the regional mangrove removal initiative cited above, MCBH will retain an active interest in exploring other opportunities over the next five year INRMP implementation period to enter into other cooperative projects in additional areas of coastal and marine conservation concern. For example, both NOAA Fisheries and State DLNR/DAR personnel were involved in a Summer 2006 workshop on planning protective resource conservation action for several marine species of concern, two of which only occur in Kane'ohe Bay near MCBH-KB: *Montipora dilatata* (Hawaiian reef coral) and *Lingula reevii* (Inarticulate brachiopod) (State DLNR, D. Gulko and NOAA Fisheries, K. Graham, pers. comm., May 2006). The purpose of the workshop is to better understand these species of concern by learning about the current status of the species, their threats, and discussing possible conservation action plans. Due to proximity of MCBH-KB to State marine habitats occupied by these species, MCBH natural resources staff will maintain an active interest in the outcome of this workshop and in participating in any interagency cooperative projects that might emerge, if appropriate.

7.5 GROUNDS MAINTENANCE AND LANDSCAPE MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Vegetation cover on nearly all MCBH parcels consists of primarily non-native (some invasive) plants, some Polynesian-introduced, and some indigenous native vegetation intermixed across developed and undeveloped lands. At the time of this writing, there are and have been no known natural occurrences of plants currently listed or pending listing as "endangered" under the Federal Endangered Species Act anywhere on MCBH properties, Some listed endangered plants (e.g., *Sesbania tomentosa*, 'Ohai), have been installed in small, deliberately-cultivated plots during the first five-year phase of INRMP implementation (e.g., demonstration native plant gardens on MCBH-KB and MCTAB established with community help; in the H-3 Static Display project, and in the Klipper Golf Course Ponds Improvement project, see the 2001 INRMP/EA for details). There are also some increasingly rare plant community remnants present on some MCBH parcels (e.g, coastal sandalwood at MCTAB and maiapilo at MCBH-KB[1]).

Regardless of the origins and regulatory status of these plants and vegetation communities found at MCBH, when evaluated objectively at the landscape level, both native and non-native cover types can support ecologically important features and functions (e.g., wetlands, fish and wildlife habitat, erosion control, ethnobotanic uses, and a more pleasant and comfortable quality of life). At the same time, however, the predominance of non-native and invasive vegetation in many areas poses undeniable management concerns. For example, alien grass cover at Ulupa'u Crater and MCTAB training areas enhances risk of "show-stopping" brush fires during dry months. Such fires pose a threat to both military training activities and protected wildlife habitat. At the MCBH-KB airfield, alien grass cover attracts feeding birds which aggravates the Bird Aircraft Strike Hazard (BASH) problem. In MCBH wetlands and coastal shoreline areas, alien, invasive mangrove encroachment degrades water quality, causes sediment build up, reduces habitat available for native foraging fish and wildlife, and has provided a hidden haven that attracts criminal behavior (e.g., documented arrests of poachers and drug-dealers).

To comply with the goals and directions of policies related to invasive species control and promotion of landscaping that preferentially treats regionally native plants (e.g., EO 13112, Invasive Species, EO 13148, Greening the Government Through Leadership in Environmental Management; and 60 FR 40837, Environmentally Beneficial Landscape Practices on Federal Landscaped Grounds), MCBH's 2001 INRMP/EA set forth guidance instructions on landscaping at each MCBH parcel, to follow a specified list of prohibited and preferred plant species when planning various projects (see Appendix F of the 2001 INRMP/EA). This MCBH requirement was "ahead of its time," since it was not until April 2006 that Headquarters Marine Corps issued a guidance letter requiring the same (see Appendix D1); i.e., that each installation establish a base-wide master plant list that identifies native and non-native plants suitable for landscaping, and invasive plants that are prohibited for any use on their installation (see Appendix D2 for MCBH's Plant Lists).

[1] Maiapilo (*Capparis sandwichiana*) is a rare, endemic plant found at MCBH-KB on the lava fields by the beach cottages.

Additional progress relating to grounds maintenance and landscape management was made during the first five years of INRMP implementation as explained below and in annual INRMP implementation progress reports (see Appendix E2). As first described in COA Component Plan 7.5 of the 2001 INRMP/EA, MCBH is continuing its required efforts to perform grounds maintenance and landscape management in such a manner as to provide sustainable realistic landscapes for training while also being responsive to conservation concerns. MCBH's existing program can become even more effective by systematically integrating these new policies into existing base plans, programs, and SOPs. This section of the updated INRMP contains a series of management efforts directed toward that end.

This COA component plan is primarily focused on continuing grounds maintenance, vegetation and landscape management improvements needed in the "built" landscapes of MCBH-KB, Camp H.M. Smith, Manana, and the training areas of MCTAB, Ulupa'u Head Weapons Range, and Puuloa Training Facility. For programmed actions covering vegetation management in or near MCBH's sensitive wildlife habitats at the two WMAs, refer to COA Component Plan 7.1 Fish and Wildlife Management.

Goal 7.5: Grounds Maintenance and Landscape Management

Maintain grounds and landscaped areas through cost-effective, environmentally sound, sustainable grounds maintenance and landscaping practices, emphasizing use of native plants, to support training needs, recreation, and natural resources compliance.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.5. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.5.1: Take a sustainable landscape approach to improve grounds maintenance and landscape management.

During the first five year implementation of the 2001 INRMP/EA, the HI21002 MCBH Master Landscape Study was completed (HDA 2002). This study updated and expanded upon earlier lists of preferred native and Polynesian-introduced and prohibited plants cited in the original INRMP/EA and provided additional recommendations for landscaping improvement on MCBH properties (see Appendix D2). The updated plant lists have been distributed widely (e.g., to facilities planners and grounds maintenance personnel, family housing staff, contract specialists) to help attain compliance. Rigorous reference to these updated lists has occurred in all MCBH natural resources staff reviews of various landscaping projects since then—both large and small. This has gone a long way toward ensuring compliance with the Executive Orders, Federal regulations, and military directives concerning sustainable landscaping.

- Continue established approach (opportunistic) to improve existing grounds maintenance and landscape management.

  This involves working with Facilities Department, Family Housing, MCCS, military operators, etc. to evaluate and recommend relevant improvements to their on-going grounds maintenance practices for adherence to Base Orders, the Base Pest Management Plan, and other pertinent SOPs. This approach is usually implemented in the form of reviews of work requests, contract SOWs, and CATEX's on project proposals to remove/replace specific trees, shrubs, and/or surface vegetation in specific areas.

- Evaluate and implement appropriate recommendations from the HI21002 Master Landscape Study.

  MCBH natural resources staff will continue to seek opportunities to implement other appropriate recommendations from the HI21002 Master Landscape Study (HDA 2002) over the next five years of INRMP update implementation. For example, the 2002 study developed a set of 'Proper Maintenance Guidelines for MCBH Landscaping Projects' that shall be incorporated as an appendix or by reference in relevant Base Orders on landscaping and grounds maintenance. Topics covered include where and what to plant; types of native plants that grow well under local MCBH conditions; how to secure, plant, grow, and maintain these native plants; recommended minimum spacing between plants and nearby buildings or utilities; how to properly prune trees and shrubs; and proper mulching, weeding, pest and disease treatments, and irrigation, based on pollution prevention and water conservation guidelines. The 2002 study also contained a number of site-specific landscaping design plans for locations on MCBH properties that need landscaping improvement. Opportunities will be explored to implement these concept designs where possible.

- Update relevant Base Orders, Plans, SOPs, and Contract Specifications to reference the latest Headquarters Marine Corps guidance and other pertinent directives on following sustainable landscape practices.[2]

  For example, per HQ USMC's 2006 guidance, the latest versions of the preferred and prohibited plant lists (see Appendix D) will be incorporated into a new Base Order (to be determined), to further ensure these requirements are known and followed by relevant parties on MCBH. This new base order will guide MCBH grounds maintenance and landscape practices and provide benefits for military training and natural resources protection.

  In addition, MCBH natural resources staff will review the existing BaseO 11014.20A, "Grounds Maintenance and Police: Standards and Responsibilities," and work with affected stakeholders to update this order, or merge it into the new Base Order cited above to comply with the updated USMC guidance. The same review and update will be performed of contract specifications to ensure the latest guidance is included.

  MCBH natural resources staff will also work with relevant stakeholders to develop and implement generic contract specifications in existing and new grounds maintenance and landscaping contracts to require adherence to Federal directives on sustainable landscaping. For example, such specifications shall include, in all grounds maintenance and landscaping contracts, a section stating the basic minimum qualifications required for all landscape

[2] This management action refines and combines 2001 INRMP/EA management actions: "Update Base Order 11014.19, 'Grounds Maintenance and Police' to reference sustainable landscape guidance" and "Develop and implement generic contract specifications requiring adherence to federal directives on sustainable landscaping."

architects, landscapers, arborists, nurserymen, and nursery source stock used in various planting or landscape repair/maintenance plans at MCBH. Selection criteria will include, but not necessarily be limited to, a specified level of qualifications and experience in sustainable landscape management as well as on-site familiarity with the environment for plants specifically present on MCBH properties. Heretofore, such standards have been applied on a case-by-case basis and will have more consistent application and lasting effect if built into generic specifications for all relevant projects on MCBH lands.

- Ensure incorporation of not less than 50% native plants into new or renovated tree, shrub, and understory landscaping.

  This "50% rule" has been followed for most landscape initiatives undertaken during the first five year implementation phase of the 2001 INRMP/EA. Guidance on approved native and Polynesian introduced species to be used, including site specific information, is provided in the Base Master Plan (Wilson Okamoto and Associates Inc. 1999), the MCBH INRMP/EA (2001), the Master Landscape Study (HDA 2002, see Appendix D2) and updates to the Master Plan (BCH 2006, in prep.) and to this INRMP, or through consultation with qualified MCBH natural resources personnel. Prohibitions on use of certain invasive plants will continue to be enforced in all new or renovated landscape design contracts (HDA 2002, see Appendix D2).

- Ensure a phased approach to inventory and eliminate/replace invasive, nuisance, high maintenance vegetation.

  To the extent possible, a prioritization scheme for performing such work shall be based on criteria such as excessive proximity to buildings, walkways, curbs, and utilities; evidence of wear-and-tear on the landscape (e.g., worn footpaths, damaged vegetation, or poor in-ground growing conditions); and potentially hazardous conditions to Base property, personnel, and visitors. For example, this approach to evaluating vegetation management priorities has been incorporated into a vegetation mapping study completed for MCTAB during the first five years of INRMP implementation (GII 2004). This study identified and mapped vegetation coverages that represent the highest brush fire risk zones on MCTAB. A follow-on vegetation management planning effort is currently underway (SWCA 2006, in prep.) to recommend a ten-year prioritized approach to implementing various vegetation management schemes in a number of priority locations at MCTAB based on such factors as military operator use frequency and degree of brush fire risk.

  Elsewhere on MCBH lands, MCCS Klipper Golf Course managers are systemically replacing the high maintenance grasses on the greens with seashore paspalum (*Paspalum vaginatum*) as it is known to be more drought tolerant and resistant to weeds. This initiative is compatible with the habitat requirements of endangered Hawaiian waterbirds found in the storm water retention ponds/wetlands on the golf course.

- Initiate a Master Grounds Maintenance and Landscaping Study for MCTAB and evaluate/implement appropriate recommendations.

  The need to initiate such a study was more fully described in the 2001 INRMP/EA. Such a study is in progress as time of this writing (SWCA 2006, in prep) as a follow-on to a baseline vegetation mapping initiative that was completed during the first five year INRMP implementation time frame at MCTAB (GII 2004). See Objective 7.5.2 for further details.

Objective 7.5.2: Identify, map and characterize vegetation and other ground cover in both maintained and non-maintained landscapes.

This action addresses the need to characterize and map vegetation cover types and other ground cover categories on all MCBH parcels. This information will serve as a baseline for evaluation and taking appropriate management actions. The approach requires determining optimum vegetation cover needed to meet military training needs, improve maintenance efficiency, and achieve natural resources management objectives. The baseline information developed can be incorporated into existing SOPs and added to the Environmental Geographic Information System (EGIS), allowing for continual updating. Examples of the potential utility of vegetation cover analysis to meet these objectives can be found in Objective 7.5.2 of the 2001 INRMP/EA. (e.g., BASH management, predator and nuisance animal management, storm water management, and erosion control). Vegetation cover analysis is also useful in identifying high fire danger areas (see Figure 17f, Appendix B) and helping develop follow-on improvements in wildland fire management strategies. The following management actions will help fulfill the objective of implementing a vegetation cover information and management system.

- Update Facilities grounds maintenance zone maps to better reflect natural resource criteria and incorporate into Base Order 11014.20A.

  Continue to work with the Facilities Department to evaluate and update their grounds maintenance zone maps to better reflect natural resource criteria and incorporate into an update of Base Order 11014.20A.

- Implement vegetation mapping and ecological field analysis studies where needed.

  A FY03-funded vegetation/ground-cover mapping analysis and ecological field analysis study (Project HI20012) was completed in 2004 for MCTAB (GII 2004).[3] This project was one of several follow-on actions to a FY00-funded baseline Invasive Species Management Study (also numbered HI20012) that was completed in 2002, earlier in the first INRMP implementation time-frame. This study identified vegetation zones of highest brush fire risk and recommended landscape changes to reduce such risk (see Figure 17f, Appendix B). During the next five year phase of updated INRMP implementation, opportunities to perform similar such studies for other MCBH parcels will be sought, based on availability of funds and priority of needs.

- Evaluate and implement appropriate recommendations from vegetation mapping and ecological field analysis studies completed.

  If there are any new vegetation mapping/field analysis studies completed in the next five year phase of INRMP implementation, this management action will be a natural next step. In the meantime, actions are on-going from the above-cited baseline vegetation mapping study completed at MCTAB. As a follow on to that study (GII 2004), another follow-on effort was commissioned in FY06 (SWCA 2006, in prep.). This study (also numbered HI20012, but titled: 'Replace Invasive Vegetation-Reduce Fire Risk-MCTAB'), comprised an ecological analysis of the field data collected in the FY03 vegetation mapping study to assist with the

[3] In 2001 MCTAB was a newly acquired MCBH parcel with a high priority for this baseline mapping due to it being a highly valued and used training area (GII 2004).

development of a more strategic approach to vegetation management at this highly-valued military training area. This project will be completed in 2006, before the next five-year phase of updated INRMP implementation begins. It will provide the baseline information to design a vegetation improvement at MCTAB (FY07) and then construct it (FY08). This project is explained in more detail below.

- HI0820012M Replace Invasive Vegetation-Reduce Fire Risk-MCTAB

  This FY07 detailed design effort is programmed and will be based on the FY06 project concept designs and cost estimates report (SWCA 2006, in prep.) to mitigate encroachment of alien vegetation (e.g., guinea grass, fountain grass, Christmas berry) at MCTAB and reduce the associated extremely high brush fire/erosion risk. For example, the design may include an approach to replacing invasive plants in the Drop Zone with a more suitable species cover to enhance training while reducing maintenance and brush fire risk.

  The FY08 effort will construct the detailed design developed in the FY07 phase to implement actions that will reduce threat of alien vegetation encroachment on MCTAB training and environment.

  Without this project, the need for MCBH to follow the requirements of EO 13112 on Invasive Species Control, and the need to sustain a vital training exercise tempo at MCTAB will not be met. Every time a brushfire occurs, training is interrupted, the training area is shut down for investigation, and possible adverse effects on health, safety, and "goodwill" from adjacent communities are encountered. MCTAB has already experienced two "close call" brush fires in recent years. This project will complement on-going efforts of the MCBH/G3 military operations department to develop and implement a more effective wildland fire management plan/strategy at MCTAB (see Section 8.1.4).

  This project will also complement existing efforts of MCBH natural resources staff, with interagency assistance, to regularly monitor MCTAB training areas, to detect, find, and remove incipient outcrops of fountain grass (*Pennisetum setaceum*), one of the most flammable, invasive noxious weeds in Hawai'i (Garrison et al. 2002). Fountain grass is adapted to fire, meaning that fire stimulates its seeds to germinate and grow. Where it is firmly established (e.g., on the Big Island of Hawai'i), it has acquired a very bad reputation among fire-fighters, because once ignited, fountain grass fires are almost uncontrollable (GII 2004). Annual "fountain grass patrols" at MCTAB have been on-going since 2001, when HIARNG natural resources staff first found an incipient fountain grass population on their leased MCTAB parcel during the time the HIARNG training center was being constructed. In that first year, MCBH and HIARNG natural resources staff teamed with State-subsidized Emergency Environmental Work Force (EEWF) workers mobilized after the "9-11" terrorist attack to perform the patrol.[4] Since then, annual patrols have continued with the help of HIARNG, O'ahu's Invasive Species Committee field workers, and the Air Force—whose lands at Bellows are also now included in the annual search. See Figure 17g, Appendix B for a map depicting the areas where fountain grass has been found and eradicated thus far from MCTAB (SWCA 2006 in prep.). However, the threat of re-invasion remains since there is a "seed bank" already established at a significant fountain grass population existing on State-

[4] In the aftermath of the September 11, 2001 terrorist attack of the United States, Hawaii's governor signed into law Act 004, to establish an Emergency Environmental Workforce (EEWF), with the specific purpose to employ individuals adversely affected by the sudden downturn in Hawaii's economy; and use these individuals to augment ongoing invasive species eradication efforts on public lands. MCBH benefited from the work of these crews for about a year, until the program was terminated, becoming the first public agency on O'ahu to employ an EEWF crew (See Sgt. Mulero, "MCBH helps aid laid-off Hawaii workers," *Hawaii Marine* (Vol 30, No. 50) of 21 Dec 2001).

lands just outside MCTAB boundaries along the ridgeline separating Lanikai from Bellows, and at Diamond Head Crater, where HIARNG facilities are headquartered (e.g., inadvertent vehicle transport of seeds across the island from this location is feasible and a likely source of the first fountain grass invasion during construction of the HIARNG training facility on MCTAB in 2001).

Objective 7.5.3: Create and maintain a "flame-retardant" landscape at Ulupa'u Head to sustain live fire training and a healthy booby colony.

There is an ongoing need to create and maintain a "flame-retardant" landscape at Ulupa'u Crater conducive to sustaining maximum live fire training opportunities while maintaining the health of the red-footed booby seabird colony. Vegetation management, grounds maintenance, and fire management practices are periodically evaluated and updated so military training and bird protection needs can continue to be met.

- Continue established vegetation and grounds maintenance management practices for Ulupa'u Head WMA and Range Facility.

  See COA Component Plan 7.1.1 Fish and Wildlife Management for further details.

- Evaluate and implement appropriate recommendations from the HI21005 Ulupa'u Crater Fire Management Study.

  The HI21005 *Ulupa'u Crater Fire Management Study* was completed in 2002 as part of the 2001 INRMP/EA implementation (BCH 2002) and comprised an update of a similar management study that was completed ten years before that (BCH 1992). Among the recommendations of the updated 2002 study was to explore additional technologies to further reduce brush fire risk through more innovative weed suppression techniques and through exploring the feasibility of installing water cannons. The need to try such technological innovations became a high priority for implementation during the 2003 time frame due to a prolonged drought creating heightened brush fire risk to the red-footed booby colony and a new USMC Safety Order (MCO 3570.1B) prohibiting fire fighters from entering the impact area to fight brushfires.

  As a result, two follow-on projects were launched in FY03 to compensate for these heightened risks and constraints. One of them (completed in 2005), was HI21007, which installed a series of gravel-anchored geotextile matting strips around key kiawe trees used for roosting/nesting by the red-footed boobies to supplement firebreaks already in place to reduce the chance of brushfires spreading into the colony and taking protected birds and their habitat. These mats have since been instrumental in discouraging brush fire spread into the colony during fires in August 2005 and June 2006. Another study recommendation which led to Project HI21008 Improve Water Delivery/Reduce Brushfire Risk, involved installation of four solar-powered, remote-controlled water cannons at the Crater to better protect the birds by pre-wetting down the vegetation near key kiawe nesting/roosting trees to discourage fire spread. While the geotextile matting project has been successfully completed, the HI21008 water cannon project is still in progress in 2006, due to various design customizations

required to adapt cannon operations to the unique landscape of the crater and to make repairs/adjustments due to bullet and fire damage setbacks suffered by the cannon infrastructure during the installation phase. This project continues to its completion during the next five-year phase of INRMP implementation and will enter a recurring maintenance phase.

Project HI21005, Ulupaʻu Fire Management Study-Update/Revise is programmed for FY11. This study will take a close look at all the management actions recommended and implemented since the 2002 study was published and make appropriate recommendations for continuous improvement. See further details below. Meanwhile, the management actions being implemented under the existing HI21005 *Ulupaʻu Crater Fire Management Study* (BCH 2002) will continue to be evaluated and improved where possible.

- HI21008 Improve Crater Water Delivery with Water Cannons/Reduce Fire Risk

  As of November 2006, additional funds have been invested to solve some technical difficulties encountered during a January 2006 performance test of the water cannons to make them fully functional according to their design criteria. Once these final technical adjustments are made, and the water cannons are available for maintenance and operation, MCBH Environmental Department will work with military operators, Facilities Department, Federal Fire Department, Safety Office and other stakeholders to develop and implement an SOP covering shared responsibilities for cannon operation and maintenance to ensure their continued effectiveness in years to come.

  The above described projects HI21007 and HI21008, in combination with earlier improvements described in the 2001 INRMP/EA and HI21005, *Ulupaʻu Crater Fire Management Study* (2002), provide defense in depth against fire risk to the birds and their habitat. They will also reduce erosion effects of repeated brushfires that degrade the landscape and reduce its capacity to support weapons training. Army resources managers have expressed interest in the potential transferability of these innovative fire-suppression techniques to their ranges.

- HI21005 Ulupaʻu Crater Fire Management Study – Update/Revise

  Since 1992, when the first Ulupaʻu Crater Fire Management Study was first published after the brush fire damage sustained during Operation Desert Storm training, MCBH's natural resources staff have maintained a systematic effort to reduce brushfire threats at Ulupaʻu Head WMA and Weapons Range as documented above, in cooperation with Facilities Department, military operators, and other stakeholders. The 1992 *Fire Management Plan for the Ulupaʻu Head Wildlife Management Area* (BCH 1992) was updated during the first five year phase of the 2001 INRMP/EA implementation (BCH 2002), and led to installation of additional fire suppression innovations (Projects HI21007 and HI21008). These projects were funded as part of the INRMP because they directly affect vulnerable protected natural resources (e.g., the red-footed boobies and their tree habitat) adjacent the weapons range. In the USMC, broader responsibilities to fund, maintain, and implement a wildland fire management plan for Ulupaʻu Crater and other military ranges, rests with the G-3/Military operations offices (see related discussions in Objective 7.1.1 Element Category Three, and in Section 8.1.4).

The CY02 completed study and its recommended approaches to addressing brushfire risks to wildlife/training at Ulupa'u Crater are being implemented as of 2006, a process that is ongoing over the next several years. MCBH G-4/Environmental is focusing on reducing fuel load available at the Crater (e.g., such as with Project HI21007 which suppresses invasive grass re-growth next to red-footed booby nesting habitat with gravel-anchored geotextile matting), and installing special equipment such as with Project HI21008 (solar-powered, remote controlled water cannons) to improve delivery of water to the bird colony and discourage spread of fire into the colony). A parallel action by MCBH G-3 military operators is to work with Federal Fire Department to improve fire response effectiveness, through improved Base Orders and cooperation).

It is anticipated that by FY11, the combined results of habitat improvements, reduced fuel loads, and improved operator response will have matured to the point that an evaluation of their combined effectiveness will be desirable. At that time (or before, if circumstances dictate), the MCBH INRMP has programmed an updated evaluation of habitat conditions for the vulnerable resources with regard to fire risk. In the meantime, MCBH G-3 will continue to play the lead role in coordinating with MCBH Environmental and Facilities Department staff, with the Federal Fire Department, and others in developing their draft BaseO 3000.1B (Wildland Fire Management Plan). MCBH recognizes and carries out the principle of continuous improvement and adaptive management with respect to brushfire reduction and prevention on all MCBH ranges. MCBH wishes to avoid the fate of the Army's training ranges in Makua Valley (Waianae Coast, O'ahu) which has been closed down periodically since 1998 for failing to have an effective fire management plan to protect native and endangered plants. The Range Training Facility at MCBH Kaneohe Bay could be closed down if another major fire injures or kills a significant number of migratory birds or if MCBH does not vigorously implement fire suppression projects already in place. Invasive non-native grasses and UXO pose significant obstacles to protecting the wildlife from injury. A continuously improved plan will help protect the Marine Corps from suffering the same fate as the US Army, as the USMC cannot afford to lose this range.

Objective 7.5.4: Improve landscape monitoring and management.

With increased Federal emphasis on the use of native plant landscaping, control of invasive species (e.g., EO 13112), and the need to follow sustainable landscape practices, the level of sophistication required in management and monitoring of MCBH grounds maintenance and monitoring programs has risen. There is a need to review and update roles, responsibilities, and qualifications of personnel responsible for planning, managing, and implementing this program. There is also a need for continued monitoring and control of invasive vegetation in ecologically sensitive and/or military training priority areas. The MCBH Invasive Species Management Study (Garrison et al. 2002), completed during the first five years of 2001 INRMP/EA implementation, includes inventory, evaluation, and recommended improvements to existing MCBH activities to control invasive plants and non-native landscape as they affect federally protected wildlife species. With these needs in mind, the following management actions are programmed.

- Formally assign grounds maintenance and landscape management oversight duties to responsible personnel.

  Presently, oversight is diffused throughout the command structure, some by Facilities Maintenance, some by Environmental Department initiative, some by the Navy Resident Officer-in-Charge-of-Construction (ROICC) or other contract oversight personnel, depending on which entity is contracting the landscape improvements, maintenance, recovery, or repair projects. Without clear lines of duty and authority, various landscape requirements can be overlooked and projects may be designed without appropriate expertise involved or standards followed. For example, oversight duties for implementation of the MCBH Pest Management Program (to include landscape and vegetation cover through herbicide application) were recently transferred from the Hazardous Waste/Pollution Prevention to the Conservation section of the MCBH Environmental Department. However, pest and grounds maintenance functions to carry out sustainable landscape BMPs reside in the Facilities Department under a different line of command authority. An updated review and evaluation of responsibilities, taskings, and interdepartmental organizational relationships are necessary to find opportunities to further clarify overlapping functional areas and operate the program more efficiently and effectively.

- Ensure assigned personnel obtain focused training on sustainable landscaping BMPs and monitoring protocols.

  Training should include topics such as: types and needs of specific native plants suitable to MCBH environments; problems posed by key invasive species found on MCBH properties; management regulations; and monitoring protocols for various activities related to job responsibilities (e.g., landscape design, planting plans, proper maintenance and monitoring techniques, available and effective techniques for native plant sustenance, and invasive weed control).

- Evaluate and implement appropriate recommendations from the HI20012 Invasive Species Management Study.

  See COA Component Plan 7.1 Fish and Wildlife Management for further details.

- Develop and apply performance measures to monitor landscape improvement projects, and make appropriate adjustments.

  Following an adaptive management approach, develop, apply and document application of performance measures used to periodically review landscape improvement projects – planned, in process, and completed – to monitor various economical and ecological benefits (e.g., ratio of native to non-native plants included; ecological benefits accrued such as water conservation, non-point source pollution filtering, increased wildlife and public recreational use). Make continuous adjustments, based on monitoring results.

Objective 7.5.5: Optimize effectiveness of education and outreach on sustainable landscaping.

MCBH has a strong tradition of volunteer involvement in: invasive weed removal, installation of plant material, and collaborative community-based projects with landscape beautification components. Through direct or indirect participation in planning, planting, maintaining, or educational visits to such demonstration sites, MCBH personnel and visitors acquire an enhanced sense of place and awareness of the requirements for a healthy, sustainable landscape. Federal Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices of Federal Grounds (60 FR 154 of August 10, 1995) notes the specific benefits of such landscape demonstration projects (see Objective 7.5.5, 2001 INRMP/EA). The following management actions continue and improve this effort:

- Sustain and improve the demonstration native plant landscape around the Environmental Department building complex at MCBH-KB.

  This landscaping project (primarily around Buildings 1359 and 1360) has already proven useful as a demonstration area for Facilities maintenance workers, contracted landscape architects, and landscapers working on native landscaping at MCBH-KB. Improvements would include such initiatives as installing labor- and water-conserving drip irrigation and developing interpretive signage and/or an information brochure about the plants, their ecological functions, cultural heritage, and uses.

- Sustain and improve demonstration native plant riparian gardens (on MCBH-KB and MCTAB).

  These gardens were developed with collaborative community involvement under a FY99 project (HI20001 Construct Demonstration Watershed Restoration Project). The demonstration gardens are located at Nu‘upia Ponds and Youth Activities Center on MCBH-KB; and at MCTAB in Waimanalo. Over the first five years of INRMP implementation, these gardens have been actively designed and maintained with the help of over a thousand community volunteers from both on and off site (see Appendix G1). Work in the gardens has supported the completion of one University of Hawaii undergraduate student’s requirements for a bachelor’s degree in Environmental Studies (Gencarelli 2003). It has supported the hours needed for various scout groups to earn their soil and water conservation badge requirements. The gardens have been the site of various educational activities by school groups at elementary, high school, college, and graduate levels. They have also been the site of service projects or educational events for a diverse range of adult groups, such as the Honolulu Garden Club, lawyers with the Hawaiian Electric Company on company picnics, visiting retired military families from the mainland; *kupuna* (elders) from local Native Hawaiian organizations and visiting VIPs from the Department of Defense. In the next five years of INRMP implementation, projects to be considered would include the development of interpretive signs and/or an informational brochure about the gardens’ evolution, specific plants, and their ecological values and functions (e.g., storm water BMPs, ethnobotanical significance). Visits to these gardens will continue to be incorporated into Base environmental tours and these sites will continue to be offered as a location for educational events by schools, garden clubs, and other groups.

- Sustain and improve the Front Gate Static Display project (HI20011) native landscaping component.

  This project was completed in the first five years of the 2001 INRMP/EA implementation. However, due to insufficient funds, the original scope of the validated project was not entirely carried out. For example, some perimeter landscape and interpretive signage displays were not fully completed because of funding shortfalls. Full implementation of the original validated design would be a desirable outcome at an "optimal" level of effort to optimize the enhanced public appreciation of native landscaping and Hawaiian "sense of place" intended by this project. Its strategic location at the front "gateway" entrance to MCBH-KB enhances its value and importance due to exposure to all who enter/leave the Base. As of 2006, the basic project that was completed is the responsibility of the Facilities Department for budgeting and maintenance, and full implementation is not as high a priority as maintaining the basic project as built. Any future improvements would have to be separately programmed and budgeted with limited in-house resources or with supplemental funds, such as through cooperative cost-sharing with an outside agency, if feasible. MCBH natural resources staff will work with Facilities to encourage further improvements to the Front Gate landscaping to incorporate environmental enhancement elements listed above, though under the current funding climate the likelihood of such project enhancements being implemented over the next five years is low. In the meantime, contacts will be sustained with groups such as the Honolulu Garden Club, that have expressed appreciation of MCBH's native landscaping initiatives to explore any cost-sharing opportunities potentially available from outside sources.

- Evaluate placement of a volunteer project coordinator billet in LE and implement appropriate recommendations.

  Such coordination can assist in making optimal use of ever-ready, enthusiastic volunteers to sustain preferred landscapes and demonstration native plant gardens; keep in-house maintenance costs down; and develop a shared community ethic of environmental stewardship and responsibility. This action could be implemented through such mechanisms as part-time hire and/or partnership agreements with schools or non-government organizations. Implement appropriate evaluation results. See COA Component Plan 7.6 Outdoor Recreation, Quality of Life, and Outreach Management for further details.

7.6 QUALITY OF LIFE, OUTDOOR RECREATION AND OUTREACH MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Providing enhanced quality of life is an explicit goal in the MCBH Strategic Plan (MCBH 2006) and is inter-related with outdoor recreation, outreach, and natural resources. Enhanced quality of life ensures military readiness, and includes such outcomes as personnel retention through provision of comfortable living accommodations, a scenic surrounding environment, and high-quality outdoor recreational opportunities for active duty personnel and/or their families. Natural resources-based outdoor recreation management has a significant role to play in providing enhanced quality of life. Popular natural resources-dependent leisure pursuits on MCBH properties include picnicking, fishing, hiking, birding, and scenic enjoyment. Per Section 11105.34 of MCO P5090.2A, outdoor recreation within the scope of an INRMP is to include any "program, activity, or opportunity dependent on the natural environment." It further states: "Developed or constructed facilities such as golf courses, tennis courts, riding stables, lodging facilities, boat launching ramps, and marinas are not included." These latter types of recreational activities are normally provided through Marine Corps Command Support Services (MCCS).[1] Finally, it states in Section 11204 of MCO P5090.2A that "a program for (natural-resources-based) outdoor recreational developments will be created in consultation with the Department of Interior (DOI) and appropriate State agency (e.g., DLNR for Hawaii)."

As described in the 2001 INRMP/EA, MCBH's natural resources outreach program governing public access to MCBH's sensitive natural resources is focused primarily on implementing service projects that fulfill environmental enhancement objectives while also providing public enjoyment to those who voluntarily assist in these projects. Thus, over the past twenty-five years, natural resources staff have maintained an active program of volunteer involvement of both on- and off-base users, in site-specific environmental service and educational projects. Thousands of individuals, mostly in groups such as scout troops, Sierra Club, Audubon Society, a variety of school, church, and civic organizations, on- and off-base, have enjoyed such activities as enhancing wildlife habitats by clearing vegetation from bird feeding and nesting locations; creating artificial nesting structures for waterbirds and seabirds; participating in annual Christmas bird counts and nesting and fish censuses; conducting nature trail maintenance and shoreline litter patrols; creating and maintaining native plant gardens; and enjoying educational camp outs. For details on numbers and types of groups, projects, and places where these activities have taken place on MCBH properties, see the Outreach Table in Appendix G1.

While these programs have reaped many rewards in terms of enhanced quality of life, community awareness and respect for the many special natural resources under MCBH care, they have been sustained by individual staff initiatives rather than through the development and implementation of a fully articulated Outdoor Recreation component plan. The following programmatic approach is being implemented to attain full compliance in this area.

[1] MCBH Environmental Department plays an oversight role in evaluating MCCS activity-oriented outdoor recreational developments to ensure compliance with environmental laws and that impacts of MCCS-sponsored activities are not adverse or conflicting with natural resources conservation stewardship mandates.

Goal 7.6: Quality of Life/Outdoor Recreation/Outreach Management

Support high quality, natural-resource-based (not activity-based) outdoor recreation/outreach experiences consistent with natural resource conservation.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.6. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.6.1: Enhance opportunities for appropriate natural resources-related recreational/outreach activities within sustainable limits.

The objective of enhancing opportunities for natural resources-related recreation/outreach activities in a manner consistent with MCBH's military mission and quality of life goals will be met by evaluating: (1) existing natural resources-related outdoor recreation/outreach program activities conducted by the MCBH Environmental Department/natural resources staff, and implementing appropriate improvements; and (2) existing natural-resources-oriented outdoor recreation activities (e.g., fishing, scuba diving, boating, recreational jogging) coordinated through other MCBH units (e.g., MCCS, Military Police) and implementing appropriate improvements.

- Complete HI41786 Outdoor Recreation/Outreach Study for MCBH-KB.

  The development of this study was planned during the first five year time frame of INRMP implementation (see COA Component Plan 7.6.1 of the 2001 INRMP/EA for details). This study was to have built upon baseline information and preliminary analysis begun in 1997 and complete it using the latest ecosystem management guidelines. However, due to the aftermath of "9-11" and emergence of other priorities, its completion was deferred and is now scheduled for FY08. The study will focus on MCBH-KB and include an updated assessment of natural resources-related outdoor recreation activities, conditions, and needs, as well as documentation of current and potential partnering opportunities with the Federal Department of Interior (e.g., USFWS, National Park Service (NPS)), the State (DLNR, Outdoor Recreation Division), and other public agencies and/or non-profit groups to help MCBH carry out its natural-resources focused outreach activities on an expanded partnering basis.

  For example, currently, an informal agreement exists between MCBH natural resources staff and Sierra Club Outing leaders that there will be a Sierra Club-assisted mangrove removal service project coordinated with Club volunteers on the second Saturday, every other month, throughout the year at MCBH-KB wetlands (primarily at Nu'upia Ponds WMA). While Sierra Club volunteers have a twenty-five year history of volunteering to do such service projects on

Base (e.g., conducting a Sierra Club High School Hiker's Program-sponsored "Ecology Camp" on base once every five years since 1983), the service project has only become a regular part of the Sierra Club Outing Leaders' Service Projects calendar over the past three years.

The sustained benefits both to the resource and to the quality of life of the volunteer participants testify to its success. Thus, from November 2003 to the time of this writing (2006) and continuing, at least 160 club volunteers completed 15 service projects involving over 770 hours of manual labor under muggy, muddy conditions to remove invasive weeds, renovate nest islands, and remove litter from MCBH-KB's wetlands/endangered bird habitat. These efforts have helped sustain valuable foraging and/or nesting habitat for several species of federally-protected waterbirds and shorebirds while providing a unique outdoor recreation/natural appreciation activity for enthusiastic volunteer participants from on- and off-base. Positive local and national publicity about this MCBH/Sierra Club partnership has been enjoyed and is documented in Appendix G2.

The FY08 programmed study will explore whether MCBH can develop other partnerships, informal or formal, on an expanded basis with other such groups (e.g., the State's Youth Conservation Corps, students from the University of Hawaii's Marine Options Program, or others interested in natural resources-related outdoor recreation activities that also further natural resources conservation goals).

This study will also inventory and evaluate increased activity-oriented general outdoor recreational use pressures in areas surrounding sensitive environmental areas under MCBH control and recommend improvements in management of such recreation (e.g., improved education, enforcement) to minimize impacts on the sensitive natural resources affected and to maintain it at sustainable levels. This study will build upon valuable baseline information and recommendations as it pertains to the marine recreation environment and recreational pressures that were presented in the *MCBH Coral Reef Ecosystem Management Study* (Shafer et al. 2002), completed during the first five year INRMP implementation period In addition, it will take into account the results of the FY03 HI20009 project in MCBH-KB's 500-yard seaward security buffer zone (USFWS 2006, in progress) (see COA Component Plan 7.4.1).

If no such evaluation takes place, increased outdoor recreation encroachment on military mission priority uses of land and water spaces and on sensitive natural resources under MCBH stewardship will occur and unsustainable pressures on both the military and natural resource base will result.

- <u>Evaluate and implement appropriate recommendations from the completed HI41786 Outdoor Recreation/Outreach Study for MCBH-KB.</u>

  In FY09, recommendations from the FY08 HI41786 study (described above) will be evaluated and relevant aspects incorporated into the next update of the INRMP due FY11.

- <u>Initiate a study of Outdoor Recreation improvements needed on MCBH parcels other than MCBH-KB.</u>

  As an outgrowth of the FY08 study, it is anticipated that a refined approach to inventorying and evaluating current natural-resources-related outdoor recreation/outreach activities on MCBH lands/waters will have been developed and planning will begin to initiate such a study for other relevant MCBH parcels following this refined approach (e.g., for MCTAB-public

beach access area, Camp H.M. Smith, and Puuloa) during the next five-year period of INRMP implementation (2012-2016).

Objective 7.6.2: Improve awareness of recreation uses, impacts, and constraints regarding MCBH natural resources.

MCBH will continue and improve upon existing environmental education, communication, and Base resident and public participation activities in order to enhance awareness and appreciation of natural resource-related outdoor recreation activities in a manner consistent with MCBH's military mission and quality of life goals. In addition, an evaluation of the current SOP for regulating fishing along the shoreline and off-shore areas within Mokapu's 500-yard buffer zone is required to insure resource harvesting opportunities that are consistent with ecosystem management principles. This evaluation needs to be done in a Koʻolaupoko regional context, with awareness of other off-base harvesting impacts on the resource base. The improved SOP will be developed consistent with sustainable fishing principles (i.e., inventory, harvesting rates, regional stock status); military mission constraints; recreational user priorities; and other cultural values (i.e., local and indigenous knowledge) and implemented as appropriate. While fishing pressures are among the natural resources-related outdoor recreation activities to be evaluated in the HI41786 Outdoor Recreation/Outreach Study (see Objective 7.6.1), the following management actions are planned toward meeting the objective focused on improving the public awareness aspects of such natural-resources related outdoor recreation pressures:

- Continuously assess and improve user awareness of environmental constraints associated with Nuʻupia Ponds Recreational Run Trail.

- Display/distribute *available* presentation materials on outdoor recreation opportunities and constraints.

  This information is currently disseminated at programmed briefings, such as the Environmental Department-sponsored SOP Class, through brochures, signs, and displays, at the monthly New Arrivals Brief, and in Hawaii Marine newspaper articles.

- Develop/distribute *additional* presentation materials on outdoor recreation opportunities and constraints.

- Review and update Base SOPs covering outdoor recreation activities that impact sensitive natural resources.[2]

  For example, during the first five year implementation period of the 2001 INRMP/EA, natural resources staff provided definitive input to an update of Base Regulations (BaseO P5500.15A updated to BaseO P5500.15B), to ensure the latest environmental regulations were incorporated into this widely-disseminated Base Order covering authorized recreational run routes along sensitive Base coastlines, as well as recreational fishing, snorkeling, camping, surfing and diving along sensitive Base shoreline areas. In 2002, a new Nuʻupia Ponds Recreational Run Access Trail was opened along an outer perimeter area of the Ponds, but

[2] The management action "Review and update public access SOPs to clarify usage within mission and natural resource priorities" from the 2001 INRMP/EA has been consolidated under this management action.

only after an EA and a Section 7 Endangered Species Act interagency consultation were completed (Drigot 2002). This process helped determine the exact route and rules of conduct to be followed along the trail so as to avoid any adverse impact on endangered waterbirds and other sensitive natural resources found in the Nu'upia Ponds WMA. The map of this route and related rules of conduct were incorporated into the updated BaseO P5500.15B, which is enforceable by Federal and State law and the Uniform Code of Military Justice. In addition, over the past five years, natural resources staff participated in determining/limiting the layout of the run route for the annual "Swamp Romp" around certain peripheral areas of Nu'upia Ponds and monitored/enforced rules of conduct during the event to avoid adverse natural resources impacts. This need is critical as the Swamp Romp has grown to accommodate over 1,000 participants a year, which can have an adverse impact on sensitive wildlife habitat if not properly controlled and supervised.

Natural resources staff will continue to oversee and provide input to revisions of SOPs covering outdoor recreation activity impacts on sensitive natural resources during the next five years of INRMP implementation.

- Review and update fishing policies, practices, and access protocols to reflect latest laws, best science, and use constraints.

  In addition to covering this management action in the programmed FY08 outdoor recreation/outreach study, specific recommendations on this topic have been included in the *MCBH Coral Reef Ecosystem Management Study* (Shafer et al. 2002). Recommendations are cross-linked and complementary to actions listed in COA Component Plan 7.1 Fish and Wildlife Management (Objective 7.1.2) and COA Component Plan 7.4 Coastal and Marine Resources Management (Objective 7.4.4). During the next five years of updated INRMP implementation, MCBH natural resources staff will continue to review and recommend Base Order updates, where appropriate, to various fishing policies, practices, and access protocols, using the information and insights offered in these study recommendations.

- Improve programs by which on- and off-Base stakeholders participate in natural resource improvement projects as a recreational activity.

  This management action is being addressed as part of the programmed FY08 outdoor recreation/outreach study. Programs to be included in this evaluation encompass ongoing natural resource improvement projects as documented in the Outreach Table in Appendix G1. One of the limiting factors on the amount of improvements/expansion of such efforts is the lack of additional MCBH natural resources staff to oversee service projects on a more frequent basis than they currently are able to accommodate. Many of these projects occur during non-office hours on weekdays and weekends when volunteers are most available, resulting in an extended work week for the MCBH staff involved.

Objective 7.6.3: Optimize interaction with regional stakeholders to address outdoor recreation impacts and opportunities.[3]

The objective to optimize interaction with other stakeholders to address region-wide outdoor recreation impacts and opportunities will be met by reviewing Federal and State recreational plans for the regions in which MCBH parcels are located and exploring opportunities to develop cooperative regional projects. The following management actions are planned toward meeting this objective:

- Explore interagency cooperative projects to reduce regional ORV impacts.

  For example, explore interagency opportunities to reduce unauthorized on-base Outdoor Recreational Vehicle (ORV) impacts by creation of a cooperatively managed designated off-base ORV recreation area for island-wide use.

- Review the State and local government outdoor recreation plans for INRMP compatibility and collaborative project opportunities.

  This policy and management plan may apply to the following areas: adjacent State-run trails along the ridge by Camp H.M. Smith; and public beach recreational areas near MCTAB. For example, explore potential joint use options for these trails by military operators for fitness training as well as public recreational use, with SOPs requiring contributions to trail maintenance in exchange for such military training use.

- Develop a program at MCTAB's beach campground that incorporates natural resource sensitivity criteria.

  This program may include brochures, signage, and briefings about appreciating and respecting the sensitivity of the surrounding natural resources while using the campground and beaches. It could include cooperative cost-sharing by Bellows Air Force Station (AFS) recreation staff who coordinate recreational activities of Bellows AFS cabin patrons, and with City/County of Honolulu personnel, who co-manage MCTAB beaches and campgrounds with MCBH under a joint-use agreement.

- Review Bellows AFS outdoor recreation program for INRMP compatibility and collaborative project opportunities.

  At time of this writing, Bellows AFS recreation staff are incorporating visits to MCTAB's native plant riparian garden along Waimanalo (Puha) Stream into their nature walk program for Bellows cabin patrons. A retired Marine and his spouse got interested in MCBH's garden on one of these walks, and contacted MCBH natural resources staff to perform regular volunteer weeding services. Over the last four years, during their annual winter visits to Hawaii and stay at the Bellows cabins, this retired Marine couple continues to serve the INRMP implementation objectives by helping sustain this community-based native plant garden (Drigot, pers. comm., 2006). In similar fashion, a group of lawyers from Hawaiian Electric Company contacted MCBH to help weed at the MCTAB garden as part of their annual

[3] "Objective 7.6.3: Integrate natural resource enhancement with outdoor recreational opportunities" from the 2001 INRMP/EA was removed and management actions consolidated in related Objectives (7.3.2, 7.6.2). The current Objective 7.6.3 was formerly Objective 7.6.4.

company picnic service project at Bellows. This has become their annual event over the last four years. In July 2006, a Hickam Air Force-based scout group coordinated with NOAA Fisheries, MCBH, and City/County of Honolulu to perform a marine debris beach clean up along Bellows Beach. These types of continuing public interest and activities show that there is great potential to expand such collaborative efforts (See record of outreach events sponsored by MCBH at Bellows over the last five years and how it has grown in Outreach Table in Appendix G1).

This page intentionally left blank.

7.7 RESOURCE INFORMATION MANAGEMENT COMPONENT PLAN

POLICY AND BACKGROUND

Both geographic and non-geographic natural resource information are essential to support planning, technical assistance, training, encroachment management, and community outreach in multiple areas and parcels covered by MCBH's INRMP. Data must be readily available, in digital or hard copy format, for effective and efficient decision support for military training exercises, sustainable land/water/air uses in support of military needs, and addressing natural resources regulatory compliance concerns.

Since the mid-1960s beginnings of a natural resources management program on parcels managed by the Marine Corps in Hawaii, a wealth of natural resources data records have been accumulated (e.g., text, video, photo, 35mm slide, artwork, oral histories, preserved biological specimens) in multiple media formats (e.g., electronic, magnetic, paper, CD, cassette). The information is graphic (e.g., cartographic, audiovisual, artistic) and non-graphic (e.g., textual, numerical, statistical) in nature. Most of it has been accumulated over the last twenty-five years during a very productive pace of program development, due to deliberate conscientious efforts of the natural resources staff who realize the importance of the data to: meet reporting requirements, achieve educational objectives, document progress, analyze trends, and for posterity.

There is an on-going need to improve archival storage of data collections. For example, Federal laws (e.g., Antiquities Act), Federal regulations (at 36 CFR), and military directives require proper curation of collected specimens of natural and cultural resources on federally-owned property (see Appendix A2). Arrangements have been made to archive biological specimens collected on MCBH properties at the Bernice Pauahi Bishop Museum[1], and—in some instances—with the Smithsonian Institution's National Museum of Natural History in Washington D.C.[2] For those non-material data collected, there is a continuing need to inventory, reorganize, and consolidate them into modern electronic formats where possible to facilitate their accessibility and enhance their availability for trend analysis and decision support, long-term preservation and ready retrieval when needed. Satisfying this need is an on-going function in the implementation of MCBH's INRMP, making this Resource Information Management COA component plan a permanent part of the INRMP implementation program.

[1] Bishop Museum is home of the State's official Hawaii Biological Survey, whose mission is to locate, identify and evaluate all native and non-native species of flora and fauna within the State and maintain reference collections of that flora and fauna for a wide range of uses.

[2] In 1982, the oldest fossil bird bone deposit in Hawaii to date was discovered by a then-graduate student at University of Washington (Mr. Gustav Paulay) along cliff banks below Ulupa'u Crater above the northeast shoreline near Mokapu Point (Dr. Drigot, primary author of this INRMP, was his escort). Periodic visits by Bishop Museum and Smithsonian Institution scientists since then, with appropriate collection permits and MCBH access support, included the condition that this scientifically valuable biological repository be properly archived at Bishop Museum and/or the Smithsonian Institution (documentation held in MCBH Environmental Correspondence Files). Thus, these public trust resources and associated data are safely and systematically archived and accessible for future generations rather than disappearing into a private collection. See publications discussing significance of these finds (James 1987 and Hearty et al. 2005). Similarly, during a botanical survey of a portion of MCBH-KB (Herbst 1999), the principal investigator arranged to house representative samples of the species inventoried at Bishop Museum. In addition, during a recent cave faunal survey on Pu'u Hawai'i Loa at MCBH-KB, the scientists (contracted through Bishop Museum), arranged for specimens and associated records to be held there (Howarth and Preston 2005).

When the 2001 INRMP/EA was first implemented, much valuable data was scattered in various paper reports and files and not readily retrievable except by "corporate memory" of the staff member within whose file cabinets, bookcases, lockers, or storage containers the data were stored. However, there had been some progress made in improving access to some of the graphic forms of these data through a pilot demonstration project (late 1980s – early 1990s), when selected environmental data of a graphic nature was digitized and stored in an automated computer mapping system on an AutoCAD platform with customized linkages to non-graphic data bases by use of dBaseIII plus software (Drigot et al. 1991). As environmental requirements and functions grew at MCBH and elsewhere, technological options for, and needs to "graduate" to a fully-developed Geographic Information System (GIS) became more and more apparent. This growth coincided with the early 1990s move of the MCBH environmental staff and these data out of their original "home" in the MCBH Facilities Department into a new Environmental Department. In their new location, the Environmental Department continued to evolve their electronic mapping system into a true ArcINFO-based GIS—the standard system already in use at other major USMC installations, many natural resources-related agencies (e.g., State DLNR, USFWS, USACOE), the City/County of Honolulu, and other agencies with whom information sharing was necessary. See COA Component Plan 7.7 of the 2001 INRMP/EA for further details of this early phase in data accumulation and Environmental Geographic Information System (EGIS) development history.

During the first five years of the 2001 INRMP/EA implementation, much additional progress has been made in archiving, inventorying, and converting (where needed) into electronic formats the relevant graphic and non-graphic natural resources data for improved decision support and in developing an electronic inventory and retrieval system for locating these data. The current goals, objectives, and management action categories in this updated INRMP are the same that drove this progress during the first five years of the 2001 INRMP/EA implementation. They are listed below, along with updated information about how continued improvements will be built on those made during the first five years.

Goal 7.7: Resource Information Management

Develop and use the best information and information management "tools" (based primarily on an Environmental Geographic Information System (EGIS)) to assist in implementing the INRMP and supporting integrated natural resources management on MCBH properties.

The set of Objectives, Approaches, and Projects/Actions described below are designed to help reach Goal 7.7. The individual projects/actions listed are distributed across the three alternative management regimes as depicted in the summary Table E3-2 (Appendix E3). The rationale and further background for each of the management actions in the table are further explained below, as necessary. For more specific examples of how these management actions have been carried out during the first five years of INRMP implementation (2002-2006), see Progress Report Table E2-4 (Appendix E2) and the Outreach Table in Appendix G1. The reader can assume that similar actions will continue over the next five years of plan implementation (2007-2011).

Objective 7.7.1: Automate available natural resources data for ease of reporting, trend analysis, and eventual integration with MCBH's EGIS.

Needed progress in addressing this objective must proceed along two parallel fronts: (1) continued improvements in standardizing geo-spatial data in the MCBH EGIS; and (2) continued improvements in inventorying available natural resources data in all its formats; improving archival storage of these data (in "hard copy" and/or electronic form), and developing a bibliographic catalogue and ready retrieval system for these data. Significant progress has been made during the first five years of INRMP implementation and is briefly summarized below, followed by a list of planned management actions.

Guidance and funding from HQ USMC have contributed to progress made during the previous five years in standardizing geo-spatial data at MCBH.[3] This standardized database will facilitate integration of essential installation information into a common format to enhance decision making and maximize mission effectiveness across installations (USMC 2004). The final product, a geodatabase, will be used by both the Facilities and Environmental Departments (see Appendix F2 for details). The standardized data will allow for easier compatibility within the USMC and with other agencies data, improving accessibility for planning purposes. It will allow for better connections among all USMC installations' GIS through a commonly-applied set of standards for data layer definition, projection, etc. so that there is more interoperability among layers and with other agency layers (such as the State of Hawaii's). Additional needs (e.g., data gaps and quality control, additional layers requiring standardization, access to data repository) are addressed in the management actions of this component plan

With in-house MCBH environmental funds programmed for INRMP resources information management support, Project HI20015 Natural Resources Data Archive/Electronic Retrieval System was initiated in FY03 to begin inventorying, and—where appropriate—converting important natural resources data into more modern and stable electronic or magnetic formats and/or storing them in a more sustainable archives (e.g., acid free containers). This project is being carried out with in-house natural resources staff and the technical assistance of a Navy document management specialist, a contracted librarian-type assistant, and the services of the Department of Defense's Automated Printing Services.

The project began with a bibliographic compilation of all natural resources data accumulated in various documents and media formats (paper, magnetic, electronic, photographic, etc.); an assessment of their current condition; conversion of critical documents to archival formats for long-term storage and retrieval purposes; and the initiation of research on Electronic Document Management technology available to ease archiving, data sharing, reporting, trend analysis, and EGIS integration purposes.

Significant progress has been made since the initiation of this project. At time of this writing, over 700 natural resources documents have been inventoried, and an assessment of their current condition has been made. A critical sub-set of these documents has been scanned into more modern, stable electronic

[3] A memorandum from the Commandant of the Marine Corps on "Guidance Regarding Implementing Geospatial Information Systems (GIS), Computer Aided Design and Drawing (CADD) and Related Technologies for Installation Management" was issued on April 15, 2003 (see Appendix F2). This memorandum included *Marine Corps Guidance for GIS, CADD and Related Technologies*, and brought the USMC into compliance with EO 12906, Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure.

or magnetic formats. A systematic electronic bibliography of resources was developed (see Appendix F1), and a critical perishable sub-set of the original edition version of these documents was put into archival storage containers. Recommendations and cost estimates for alternate ways of fully implementing a prototype electronic storage and retrieval system are being developed by the Navy document management specialist assisting this project, so that there can be continuous improvement over time with improved technology and added data.

With phased increases in funding over the next five years of updated INRMP implementation, continuous development, update, and improvement of this system will occur. By FY10, improvements made to the system thus far will be reflected and incorporated into the next five-year INRMP review/update due in 2011.

This effort is proceeding parallel to and being integrated with an on-going Base-wide Environmental Management System (EMS) effort (see Section 5.1.2), part of a USMC commitment to developing an EMS for all their installations. Funds will be periodically invested to maintain the system. This will also make it easier to share data among agencies and implement ecosystem-based management efforts with cooperating partners. Without a natural resources data storage and retrieval system integrated into the larger USMC-wide EMS, MCBH would have an increased risk of losing valuable "corporate memory" needed to meet compliance required reporting requirements and address future needs. The following management actions have been programmed toward this end.

- <u>Update inventory of available natural resources data and bibliographic database, and determine archival priorities.</u>

  Librarian assistance and document specialist expertise will continue to assist natural resources staff to review, collate, categorize, and prioritize available natural resources data; recommend a strategic approach to archiving irreplaceable information (e.g., original photos, tapes); develop cost estimates for the archiving process; and explore cost-share partnering with other specialist institutions interested in these data (e.g., National Park Service, State Archives, Bishop Museum, Smithsonian Institution, USMC Museum, University of Hawaii). The automated bibliographic database of materials will be expanded and improved to make future additions, data searches, and accessibility easier.

- <u>Implement archival action priorities, as appropriate.</u>

  Based on the results of the archival prioritization exercise, recommended actions for improvement will be implemented, as appropriate.

- <u>Inventory available natural resources data amenable for integration with MCBH's EGIS and determine conversion priorities.</u>

  A relevant subset of data in the bibliographic database will continue to be converted into formats amenable for integration with MCBH's EGIS. For example, reports with maps and related databases that either already exist in the required GIS format as part of the final deliverable or need conversion into the USMC-approved GIS format will be identified and cost estimates for their conversion will be developed with Navy document specialist and HQ USMC GIS program director help. Cost-share partnering with other specialist institutions

interested in sharing these data will be explored (e.g., USFWS, State DLNR, NFMS, University of Hawaii, National Park Service).

- Implement data conversion priorities for the MCBH EGIS, as appropriate.

  Based on the results of this exercise, recommended actions will be programmed and budgeted. Depending on the amount, timing, and source of funds made available, appropriate data will be converted into the MCBH EGIS, over time.

Objective 7.7.2: Maintain and enhance natural resource management databases for MCBH-KB in MCBH's EGIS.

This action addresses the need to maintain and enhance the current EGIS for MCBH-KB. In order to be effective as a decision-making tool for resource management, the MCBH EGIS must contain current, standardized information related to natural resource management, including base-map information and natural resources information. There is also a need to enhance the current EGIS for MCBH-KB by developing new spatial data sets detailing issues that present management concerns as new data and information become available (e.g., electronic files from consultants; data layers from partner agencies; data sets developed internally). The following management actions are planned toward meeting this objective:

- Review and update established MCBH's EGIS natural resources data files and associated metadata for compliance with DoD standards and data accuracy.

  For example, develop an SOP, dedicate appropriate staff, and provide necessary personnel training to ensure all relevant MCBH's EGIS natural resources data files and associated metadata comply with established DoD standards. These include Spatial Data Standards (SDS) for file management, file naming and version control and Federal Geographic Data Committee (FGDC) compliant metadata. In addition, the data should be evaluated for accuracy and to ensure that essential database information is included with the data layers.[4]

- Continue to update EGIS layers (opportunistically) obtained from MCBH contracts, activities or outside agencies.

  Continue to regularly update standards-compliant EGIS base layers obtained from MCBH contracts, activities (e.g., those maintained by the Environmental and Facilities Departments) or outside agencies at least once annually, preferably more often (half-yearly or quarterly). This can be done as part of the required INRMP annual review and update, as appropriate.

[4]The recent initial HQ USMC GEOFidelis effort to standardize MCBH data layers was incomplete and partially inaccurate. Importantly, the natural resources data needs additional quality control to ensure relevant data was not lost in the conversion process (e.g., points, lines and polygons and/or associated descriptive fields). This problem stems, in part, from the use of the SDS system; if there was no field that corresponded to existing data, that data was dropped from the file. It will be important to re-associate this data with relevant layers, otherwise their value for analysis is lost. In addition, there are other natural resource data layers that need to be standardized into the MCBH EGIS geodatabase. The next phase of GEOFidelis provides resources and guidance to continue working on the geodatabase (see Appendix F2).

For example, the 2002 jurisdictional wetland boundaries (see COA Component Plan 7.2 Wetland Management) were incorporated into MCBH's EGIS but a companion database needs to be developed in the EGIS with information in the 2002 study so that existing information on the major ecological characteristics of each wetland and associated data on how wetland boundaries were determined can be readily accessed through the GIS, without having to consult the study (Ching 2002). This would use additional functionality of the GIS, rather than just providing a two-dimensional map showing wetland boundaries.

In addition, the WMA boundaries at MCBH-KB were updated to more accurately reflect on-the-ground conditions. A revised boundary for the Ulupa'u Head WMA had become final with the publication of the 2001 INRMP/EA; recent changes reflect more accurate alignment with topographical features as depicted in the MCBH EGIS. The Nu'upia Ponds WMA was reconfigured in 2006 by natural resources staff, and with the aide of a GPS, to better reflect on-the-ground locations of environmentally sensitive wetlands and wildlife. This adjustment addresses a deficiency cited during a HQ USMC Environmental Compliance Evaluation (ECE) audit in February 2006, that the INRMP must contain more maps delineating environmentally sensitive, protected wetland and wildlife habitats (TEC 2006). The adjusted WMA boundary now includes relevant newly-delineated wetlands (2002) that were not delineated along Nu'upia Pond margins prior to the printing of the 2001 INRMP/EA. It also aligns better now with known bird nesting locations (both waterbirds and shearwaters), and with physical landmarks and property boundaries. These WMA adjustments were also required because the WMA boundary lines had become distorted over the years through the transfer process to ever newer, more sophisticated mapping systems. The original WMA boundaries were depicted graphically, not cartographically, in a 1966 Sikes Act interagency agreement to establish the WMAs (stored in MCBH files). In the 1980's, the boundary was transferred by hand-digitizing into the CAD-based computer mapping system at Facilities Department as part of an environmental mapping project at the time (Drigot et al. 1991). Since then, as MCBH's maps and aerial photographic coverage of MCBH features have become more sophisticated and accurate, the "original" WMA boundary layer had to be adjusted accordingly. The adjusted Nu'upia Ponds WMA boundary now matches the known environmentally sensitive areas in the ponds (e.g., wetlands and wildlife) more accurately and is more easily identified in the field. As a result of this adjustment, the estimated acreage of the Nu'upia Ponds WMA is 515 acres.

- Update EGIS layers (systematically) obtained from MCBH contracts, activities or outside agencies.

- Inventory new natural resource data, add to bibliographic database, and incorporate into EGIS, as appropriate.

  Inventory, at least once annually, any new natural resource data collected (in-house, from contractors, other agencies, etc.); add to automated bibliographic database; arrange appropriate archival disposition; assess value for incorporating into the MCBH EGIS; and implement as appropriate.

- Maintain generic contract specifications to ensure delivery of data sets that are compliant with current EGIS and DoD standards.

  Include standard language in all contracts involving natural resources-related investigations to ensure delivery of MCBH EGIS and DoD compliant data sets (see Appendix F2). Update

this guidance per HQ USMC or other Federal guidance as needed.

- Develop and implement a standardized SOP for tracking significant natural resource observations.

  Develop and implement a standardized SOP for recording, automating, and mapping significant natural resource observations (plants, wildlife, erosion, damage, etc.) at routine intervals, in association with specific report requirements, and/or when incidentally encountered. Review and update at least once biennially. Some progress has been made toward this end with the assistance of a contractor in 2006 (see C. Volinski work, Appendix F3).

Objective 7.7.3: Develop basemaps and related natural resources databases for MCBH properties other than MCBH-KB.

This action addresses the need to develop basemaps and related natural resources databases for MCBH properties besides MCBH-KB, consistent with the existing EGIS. Available baseline information, including basemaps and natural resources data, was incorporated into the geodatabase during the recent HQ USMC effort to standardize data layers for all properties. The following management actions are planned toward meeting the objective of developing additional datasets for natural resources on all MCBH properties, consistent with the existing EGIS:

- Inventory available natural resource data for MCBH properties other than MCBH-KB and integrate into the MCBH EGIS.

  Any data being integrated will be compliant with current MCBH EGIS and DoD standards.[5]

- Incorporate database requirements into relevant natural resource projects conducted on MCBH properties other than MCBH-KB.

Objective 7.7.4: Optimize Base-wide sharing of natural resource management data.

The recent HQ USMC funded GEOFidelis project consolidated the spatial information used at MCBH into a single geodatabase accessible by both the Environmental and Facilities Departments. Although Facilities still operates to a certain degree in an AutoCAD environment, the shared data is provided in an ESRI ArcGIS platform. The goal is to host this geodatabase on a network so that all approved users have access to the same data. Facilities will be the lead department responsible for incorporating any updates into the geodatabase.[6] However, interdepartmental responsibilities still remain to be clarified, including how updates to the database will be incorporated, and who will do and how data conversions

[5] The management action "Review and update available data files and associated metadata for properties acquired since 1994 for compliance with DoD standard" from the 2001 INRMP/EA has been incorporated into this management action.

[6] This accomplished a management action from the 2001 INRMP/EA: "Establish a lead department or entity on MCBH in this area (e.g., Environmental, Facilities, ISMO) and clarify interdepartmental responsibilities."

will be done (e.g., AutoCAD to ArcGIS and vice versa). In addition to consolidating the existing data into one location, this project also adopted a real world coordinate system that facilitates sharing of data between departments and with outside agencies.[7] Although significant progress has been made, the following management actions are planned toward continuing to optimize coordination and integration of the EGIS capacity between the Environmental and Facilities Departments:

- Update EGIS strategic plan to leverage limited EGIS and AutoCAD mapping capabilities of the Environmental and Facilities Departments regarding natural resource data.

  An existing, outdated EGIS strategic plan for MCBH needs to be reviewed and either updated in cooperation with the Facilities Department and other appropriate on-base parties, or cancelled if it is determined that HQ USMC geospatial guidance documents are sufficient. The strategic plan was initially created to better leverage the limited EGIS and AutoCAD mapping capabilities of the Environmental and Facilities Departments regarding natural resource-related attribute data for all MCBH parcels. It was developed when the Environmental Department was first created as an off-shoot of the Facilities Department, in anticipation of the growth of two systems that would need to remain complementary in function. However, the system, technology and emergent standards requirements have outpaced the currency of the original strategic plan. In addition, multiple staff turnovers and organizational changes have occurred that necessitate an updated plan or a deliberate decision to drop the plan. This plan would involve use of dedicated, qualified staff and/or consultant expertise to perform an updated assessment of user needs, system capabilities, available budgets and propose various options for improved leveraging for more effective data exchange and greater accessibility among divisions.

- Evaluate and implement appropriate recommendations from the updated EGIS Strategic Plan.

- Develop and implement coordination protocols between the Environmental and Facilities Departments to ensure use of current and standard natural resources data sets.

  With or without a EGIS strategic plan, there needs to be an updated written SOP between the Environmental and Facilities Departments that incorporates standards and mechanisms to ensure currency of layers and that data exchange does not result in loss of SDS structure and metadata.

[7] With the HQ USMC standardization process, and the adoption of a real-world coordinate system, the management action "Perform benefit/cost and consultations regarding Base-wide adoption of real world coordinate system for use with GIS data" in the 2001 INRMP/EA has been completed.

Objective 7.7.5: Optimize interaction with other agencies to facilitate sharing of natural resource management data.

This action addresses the need to develop more specific data sharing and data exchange relationships with other institutions (e.g., sister military agencies, other Federal, State, City/County agencies and/or private institutions) to facilitate the maximum possible exchange of GIS databases related to natural resources management. INRMP implementation at MCBH would be greatly enhanced by the ability to easily share data with these other agencies. This is especially important in the context of DoD-mandated ecosystem management and EMS requirements; the need for effective and efficient regional planning and coordination in response to terrorist threats, natural catastrophes, or epidemics (e.g., avian flu); the need to more effectively address encroachment issues; and due to a number of INRMP projects/management actions where coordinated efforts from different agencies are necessary. The following management actions are planned toward meeting the objective of improving data exchange between MCBH and outside agencies:

- Inventory GIS and other databases developed by other agencies with similar natural resource mandates.

  Agencies include, but are not limited to: Air Force, Army, USACOE, USFWS, NOAA Fisheries, State DLNR, Office of State Planning, and City/County of Honolulu. Identify appropriate points of contact for further discussions about data exchange and system comparisons.

- Explore development of cooperative data sharing agreements with other agencies.[8]

  Agreements may be in the form of cooperative agreements, MOUs, or other appropriate mechanisms. Data sharing agreements will be implemented, as appropriate. Integrate into MCBH's EGIS the most updated, accurate and standards-compliant data available from similar natural resources agencies obtained through these agreements. Maintain relationships/agreements to ensure all parties have up-to-date information and are following consistent standards. Interview, correspond, conference with or otherwise obtain information from other natural resources agencies regarding information on capability, design, use of their established/planned GIS and system modifications to better support INRMP implementation.

Objective 7.7.6: Optimize technical capacity of and access to the MCBH EGIS.

This action addresses the need to maximize the technical capacity of and overall accessibility to the MCBH EGIS to serve the needs of the natural resources management program. The system needs to be understandable and accessible for both internal and external use. In order to support the demand for use and to provide technical capacity necessary to use the EGIS as a tool for natural resource decision

[8] The management action "Implement developed data sharing agreements, as appropriate" from the 2001 INRMP/EA has been consolidated under this management action.

making, the overall system (hardware, software, data, training of EGIS system operators and output users, etc.) must be evaluated and updated on a regular basis. The following management actions are planned toward meeting this objective:

- Evaluate and update existing natural resources databases and administrative and technical support systems, as appropriate.

  Evaluate and update, as part of the INRMP annual review, the currency of existing natural resources databases and the administrative and technical support systems to ensure they follow the latest available software, hardware, and data standards. Ascertain necessary system enhancements or changes, and implement. Ensure that all EGIS computer hardware, software peripherals and maintenance agreements are current. Review GIS data at least once annually to advise resource managers of needs to fund updates of data sets during budget planning and programming.

- Develop, annually update, and implement an EGIS-specific training plan for relevant staff.

  Ensure relevant staff are trained in appropriate input, maintenance, output, and use of the MCBH EGIS and associated products. This requires that the Environmental Department's GIS specialist and other staff responsible for operating and maintaining the system annually obtain focused training regarding current technologies and make optimal use of best GIS technology available as related to natural resources management on a military installation. Evaluate and improve capacity of current staff to understand and use the EGIS system more efficiently and effectively through training of in-house personnel who produce and/or use EGIS products.

- Develop and implement an SOP for clarifying roles and responsibilities for users of the MCBH EGIS system.

  Develop and implement an SOP which clarifies roles and responsibilities of the staff who maintain, enhance, operationalize, and/or use the MCBH EGIS system for natural resource management and decision-support.

- Provide in-house personnel easier access to commonly used GIS maps and other natural resources data.

  This is being implemented with the assistance of the HQ USMC funded GEOFidelis program (see Appendix F2).

- Maintain a readily accessible standard set of electronic natural resource management data.

  Maintain and make available a standard set of electronic baseline data/GIS layers pertinent to natural resources management for both internal and external use. Ensure that such information is available to other agencies, contractors, and various stakeholders (via public website and/or by specific request) in a timely manner, with appropriate controls over ownership, distribution, and update. In the process of determining availability of various natural resources data sets, it is understood that some may be unsuitable for public sharing due to security concerns or other sensitivities. Some progress on this action has been made

with the assistance of HQ USMC geospatial data project over the first five-year period of INRMP implementation and is expected to continue over the next five years of updated INRMP implementation (see Appendix F2).

Objective 7.7.7: Use a Global Positioning System (GPS) unit for gathering natural resources data.

A Global Positioning System (GPS) unit is an important tool for gathering information pertaining to natural resources. In pursuit of a management action listed in the 2001 INRMP/EA, MCBH obtained specialist assistance in evaluating various types of GPS's potentially available and usable within the specific context of USMC computer system support requirements and MCBH natural resources staff needs (e.g., limited budget, user friendliness, no elaborate training or maintenance requirements). After this evaluation, two Garmin GPS units (model 76Cs) were acquired and put to immediate use to map locations and/or extent of area covered by various natural features or phenomena (e.g., endangered stilt nest locations, perimeter of experimental plant plots; land or water areas of management concern) and collect associated information.[9] However, since then, MCBH computers were converted to the control of NMCI (DoD contractor that owns and maintains Navy-wide computer systems). Use of the Garmin units to their full potential requires overcoming constraints imposed by that action. The version of Garmin MAPSOURCE software supporting the units purchased by MCBH, is an updated version than the earlier version on the pre-approved list of software supported by the USMC contract servicing NMCI's computers at MCBH.[10] Since there is no backwards compatibility with earlier versions of Garmin MAPSOURCE software, the more modern, MCBH-purchased Garmin units cannot be used to their fullest potential until this matter is resolved. Until then, the data (e.g., latitude/longitude points) identified by Garmin units during field use must be manually recorded by the field operator and later manually transferred onto MCBH NMCI computers, thus negating one of the advantages of having a GPS—the ability to rapidly transfer data from field to computer, and download and use the data for timely decision support.

In order to resolve this software issue, approval procedures require MCBH to "rationalize" the software (e.g., obtain HQ approval and successful NMCI testing of the software) and then pay NMCI to install and host the software. Currently, there is no budget for this and even if there were, it takes an inordinate amount of time to get "approval" for such software updates and their installation on NMCI's computers. The process, however, has begun and once this problem is resolved, the GPS units will provide MCBH with more efficient and effective data collecting ability useful for managing natural resources and responding in emergencies.

Improvements in data collection protocols and processes for making the data available in a timely manner and useful format for decision-makers are on-going. The following management actions are planned toward the goal of improving MCBH's capability of using GPS to support natural resource management activities.

[9] This completed a management action in the 2001 INRMP/EA "Acquire an appropriate GPS unit for use by LE (Environmental Department) personnel".

[10] Trimble Navigation GPS units are on the contract-approved list to be hosted by NMCI, but they are costly and require additional training in order to use effectively and, thus, are not as practical for MCBH use as the Garmin units.

- Resolve issues related to GPS data collection and NMCI.
- Develop and implement standards for collection of GPS data and its incorporation into MCBH's EGIS.
- Develop an SOP for using the GPS in the field and for data translation, with a software interface that is user friendly for Environmental Department personnel.

SECTION 8
RELATIONSHIP OF OTHER PLANS AND PROGRAMS TO INRMP

MCBH has a presence in several regions around O'ahu. As a responsible land steward, MCBH must ensure compatibility of its land use activities with those of others in these regions. This section summarizes the relationship of other plans and activities – both on and off-base – to the MCBH INRMP that are consistent with and complementary to many of the management actions detailed in Section 7.

8.1 CONSISTENCY WITH OTHER MCBH PLANS

Guidance on INRMP preparation (HQ USMC 2006) stipulates that INRMPs shall be prepared or revised in coordination with other installation plans including, but not limited to: installation master plans, range plans, training plans, Integrated Cultural Resources Management Plans (ICRMPs), pest management plans, Bird/Aircraft Strike Hazard reduction plans, and installation restoration plans. This section briefly summarizes the key interrelationships of the INRMP with these plans and references where the other plans may be obtained for more detailed information.

8.1.1 MCBH STRATEGIC PLAN

The *MCBH Strategic Plan* outlines the Mission, Vision, Guiding Principles, and Strategic Goals to make MCBH the Base of Choice for the 21st Century (MCBH 2006). This is accomplished by maintaining facilities and providing services that support readiness and global projection of operating forces and promote quality of life for all personnel. The importance of the INRMP in meeting these goals is recognized by Strategic Goal #6, *Preserve the Environment*, with particular emphasis on Improvement Strategy 6.1, "Continue to implement MCBH's Integrated Natural Resources Management Plan." The *MCBH Strategic Plan* is maintained by the Commanding General's office and is posted on the MCBH website: http://www.mcbh.usmc.mil/plan/plan_cover.htm.

8.1.2 MASTER PLANS

MCBH Master Plan

The current *MCBH Master Plan* was prepared in 1999 and is the official planning document for MCBH (Wilson Okamoto and Associates 1999). An update of the *MCBH Master Plan* is in progress and should be finalized before the end of 2006 (BCH 2006, in prep.). The plan provides a useful description of

existing facilities, development constraints and recommended land uses, and cross-references relevant sections of the MCBH INRMP. The 1999 plan covers MCBH-KB, MCBH-CS, Manana Housing Area, Puuloa Training Facility and outlying training areas, while the updated plan will encompass additional properties acquired since 1999 at MCTAB, as well as MCBH-KB, MCBH-CS, Manana Housing Area, Puuloa Training Facility, Pearl City Annex, and Molokai Training Facility. MCBH Environmental has commented on the draft update, to ensure it cross-references the MCBH INRMP. The plan was developed through the Department of the Navy, Pacific Division, Naval Facilities Engineering Command for MCBH.

MCTAB Master Plan

The *MCTAB Master Plan* was approved in January 2002 as the official planning document for MCTAB (Group 70 2002). It is being cross-referenced in the updated *MCBH Master Plan* (BCH 2006, in prep., see above). It provides a description of existing facilities, development, constraints and recommended land uses to be carried out in future facilities planning and development. The plan contains numerous references to on-going and planned natural resource management activities at MCTAB as described in the INRMP (in particular those that integrate with planned land use and/or training activities) and cites the INRMP as a 'Related Publication' in Section B.8. The *MCTAB Master Plan* was developed through the Department of the Navy, Pacific Division, Naval Facilities Engineering Command for MCBH.

8.1.3 RANGE AND TRAINING PLANS

As detailed in Section 3.6, integration of the INRMP with the military mission is important to sustaining training opportunities. This is accomplished, in part, by coordinating INRMP management actions with military operators in the MCBH G-3 office and designing INRMP actions to be compatible with military training actions and plans. The MCBH Range Plans are maintained by Assistant Chief of Staff (AC/S) G-3, manager of military operations at MCBH (see Table 4-1, MCBH Organizational Chart) as Base Order 3574.6: Standing Operation Procedures for the Range Training Facility (September 24, 1997). The MCBH Training Plans are also maintained by AC/S G-3 under Base Order P1500.9: Standing Operation Procedures for Marine Corps Base Hawaii Training Areas, Courses, and Facilities (Short Title: SOP for Ranges and Training Areas) (May 12, 2000).

8.1.4 WILDLAND FIRE MANAGEMENT PLAN

The US Marine Corps holds G-3/Operations (not G-4/Environmental) responsible for developing appropriate wildland fire management plans. In 2006, MCBH's G-3 is drafting BaseO 3000.1B, Wildland Fire Management Plan to replace and update BaseO 3000.1A Chapter 1, Fire Bucket Standby Order. G-3 continues to maintain Chapter 9 of BaseO 3574.6, SOP for Ranges and Training Areas (referenced in Section 8.1.3). G-3 has requested funds from the Comptroller in 2006 to develop and implement a specific wildland fire management plan for MCTAB. Complementary to these G-3 initiatives, G-4/Environmental's INRMP actions focus on identifying areas of highest wildland fire risk through such projects as vegetation mapping studies, development of a vegetation management strategy for MCBH ranges, and by funding projects to reduce invasive, fire-prone grasses and replace them with more sustainable, less flammable ground covers. These INRMP actions are discussed in Section 7 of the INRMP and are primarily the responsibility of G-4 (Environmental/Facilities Departments) to execute.

8.1.5 INTEGRATED CULTURAL RESOURCES MANAGEMENT PLAN

The *MCBH Integrated Cultural Resources Management Plan* (ICRMP) is being prepared (Wil Chee - Planning and Environmental, Inc. 2006) under DoD and Marine Corps guidance by the Environmental Department staff archaeologist who serves as the Cultural Resources Manager for MCBH. The ICRMP complements the INRMP and documents the approach being followed to manage the wealth of cultural resources found on MCBH properties. The documents cross-reference each other as necessary, and the Environmental Department staff works together to ensure that natural resource projects receive appropriate review under cultural resource guidelines, and vice versa. The ICRMP is maintained by the Cultural Resources Manager in the Environmental Department.

8.1.6 MCBH PEST MANAGEMENT PLAN

The *MCBH Pest Management Plan* covers pest management programs including integrated pest management principles (for insect pests, weeds, and vertebrate pests such as rodents), health and safety considerations, environmental considerations, and schedules of pest control and authorized pesticides. The plan describes pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the pest management program. Currently undergoing revision, the Draft MCBH Kaneohe Bay Pest Management Plan covers MCBH-KB, and includes housing and administrative areas at Camp Smith in an appendix (NAVFAC Pacific 2006, in prep.). The GS-11 Natural Resources Management Specialist in the Environmental Department has been appointed the Installation Pest Management Coordinator, and works with the Facilities Department and a NAVFAC Pacific or Naval Environmental and Preventative Medicine Unit 6 (NEPMU-6) entomologist to maintain and implement the plan.

8.1.7 BIRD AIRCRAFT STRIKE HAZARD REDUCTION PLAN

The air support facilities at MCBH-KB are subject to Bird Aircraft Strike Hazard (BASH) requirements (see COA Component Plan 7.1.5 of this INRMP and Section 4.5.3 of the *MCBH Invasive Species Management Study*, Garrison et al. 2002 for further details). Flight Operations and Air Facility are responsible for clearing potential Bird Air Strike Hazards from the runways and taxi approaches. Reducing the threat to human lives and aircraft safety and damage is key to the military mission. Pest birds such as cattle egrets, mynas, pigeons, doves, shorebirds and finches on and near runways affect human safety by posing flight hazards. Other pests such as mongoose and cats, can also affect the safety of flights taking off and landing on the airstrip. A *Bird Aircraft Strike Hazard Reduction Plan* has been developed by Marine Corps Air Facility (MCAF) personnel, who operate the BASH program (MCAF 2004). MCBH Environmental coordinates regularly with the MCAF airfield manager to ensure that the policies and guidelines outlined in the plan are implemented to reduce the bird and animal hazards by making airfields and areas adjacent to runways less attractive to wildlife. The *BASH Reduction Plan* is maintained by MCAF (see COA Component Plan 7.1.5 for further details).

8.1.8 STORM WATER POLLUTION CONTROL PLAN

The *Storm Water Pollution Control Plan (SWPCP)* was developed to meet Federal and State storm water compliance regulations (Title 40 of US CFR: Protection of Environment; National Pollutant Discharge Elimination System (NPDES) Permit Program; Hawaii Administrative Rules, Title 11, Chapters 54-55; Clean Water Act) (HPE 2001). It includes a base description, a Non-Storm Discharge Elimination and Prevention Program, a Storm Water Pollution Prevention Plan, and a Monitoring and Reporting Program Plan. The SWPCP establishes policy, responsibilities, procedures and technical guidance on the prevention and elimination of pollution of storm water runoff from industrial areas at MCBH Kaneohe Bay. The SWPCP was commissioned and is maintained by the Commander, Pacific Division, Naval Facilities Engineering Command. The examples below demonstrate interaction between INRMP and SWPCP activities:

1. A $1.6M FY03-funded project was completed to improve storm water runoff at a maintenance compound by resurfacing the area, installing permeable perimeter cover, and grease rack containment;

2. Over 30 years, the State has permitted MCBH to irrigate base grounds with recycled treated effluent from its Water Reclamation Facility (WRF). Recent cleanout of the WRF polishing pond led to doubling daily effluent use for water-conserving irrigation (350K to 750K gallons). An endangered Hawaiian stilt chick was discovered in the vegetation build up at the bottom of the near-drained polishing pond during the prolonged maintenance clean out period in CY2005. It was guarded vociferously by its parents, and with vigilance by WRF personnel who tracked its growth into a successful fledgling, and named him “Wilt the Stilt” before he successfully flew off into the wild wetlands beyond the fence. These activities were coordinated between MCBH natural resources staff, WRF managers, and USFWS biologists.

8.1.9 SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN AND INTEGRATED CONTINGENCY PLAN

In compliance with the Oil Pollution Act (1990) and other Federal directives as summarized in MCO P5090.2A (Chapter 7), MCBH maintains response capability with a *Spill Prevention Control and Countermeasure Plan (SPCC)* and an *Integrated Contingency Plan* (MCBH ECPD 2006). The purpose of the SPCC is to establish procedures to prevent an oil spill and to document existing oil spill prevention structures, procedures and equipment with recommendations for additional equipment if needed. The Plans specify response strategies, including the resources required (manpower, boats, booms), water depths at response locations and ecological sensitivity of response locations. MCBH activities that pose spill threats have also been identified, and regular spill drills are conducted with other agency partners involved in implementing the Area Contingency Response Plan. While the Area Contingency Response Plan identifies some of the environmental sensitivities in Kane‘ohe Bay, the Plan does not adequately address reef ecosystems. All participating agencies in the Area Contingency Response Plan share in the burden to more adequately address reef ecosystems – not just MCBH. The US Coast Guard is the primary agency responsible for emergency oil spill response in Hawaiian waters and has the authority to take control and Federalize the response activity if appropriate action is not being taken by the responsible party. In the event of a major spill from a non-MCBH responsible party that threatens Kane‘ohe Bay, the Coast Guard would initiate a coordinated response among local stakeholders under the Area Contingency Plan, including agents from USFWS, NOAA Fisheries, DLNR, and DOH.

8.1.10 EMERGENCY RESPONSE PLAN (ERP)

In addition to the specific spill response emergency plans cited above, MCBH maintains BaseO P3140.6, Emergency Response Plan (ERP). The ERP covers response responsibilities and actions in the event of natural disasters such as tropical cyclones, hurricanes, tsunami, storms/floods, and earthquakes. The MCBH Environmental Department spill response coordinator is a member of the team of MCBH functional managers that must be available on a 24-hour basis to help implement appropriate response actions.

8.1.11 INSTALLATION RESTORATION AND NATURAL RESOURCES DAMAGE ASSESSMENT PROGRAM COMPATIBILITY

The USFWS is particularly interested that military installations address possible effects to natural resources from environmental contaminants due to past or contemporary releases to the environment.[1] The Installation Restoration Program (IRP) identifies, investigates, cleans up or controls hazardous substance releases from past waste disposal operations and spills for contaminated sites on Navy/Marine Corps lands. Cleanup is mandated by CERCLA (Comprehensive Environmental Response, Compensation and Liability Act) and SARA (Superfund Amendments and Reauthorization Act) to protect public health, welfare, and the environment. MCBH is an active participant in this program. Details of the IRP program covering MCBH lands are coordinated under the Compliance section of the MCBH Environmental Department and in cooperation with the US Air Force IR program covering MCTAB lands transferred from Bellows AFS to USMC custody.[2] The MCBH and US Air Force IR program coordinators ensure that appropriate internal staff and stakeholder agencies provide review and comment during the development of decision-strategies on clean up actions as they evolve. These stakeholder agencies include, but are not limited to, USFWS, DLNR, and NOAA Fisheries, whose staff have particular expertise and concern about the release of environmental contaminants and their effects on natural resources.

IR sites are present at the following MCBH installations: MCBH-Kaneohe Bay, MCBH-Camp Smith, and MCTAB. None of the INRMP management actions coordinated through the Conservation section of the MCBH Environmental Department are located on any MCBH IR sites. Some INRMP actions may involve soil disturbance at locations where past soil contamination may be present to some degree but are not eligible for IR consideration. In these areas, the appropriate mitigation is pre-disturbance soil testing, ensuring that chosen methods of soil removal and disposal are legally approved to match the level and type of contaminants that may be present, and conducting interagency consultation during the planning and environmental review process (as discussed in Section 8, Environmental Consequences of the 2001 INRMP/EA). There are no inconsistencies or conflicts with the IR program. USFWS is interested in ensuring that the environmental effects of environmental contaminants on affected natural resources are adequately addressed. A series of management actions in Section 7 specifically address this area of concern related to minimizing likelihood of contemporary releases of oil or hazardous substances and ensuring MCBH performs appropriate actions as a Natural Resources Trustee (see, for example, COA Component Plan 7.4 Coastal and Marine Resources Management).

[1] As stated in a USFWS Memorandum of July 31, 2001 on Regional Internal Review Procedures and Coordination of Department of Defense Sikes Act Integrated Natural Resource Management Plans (generated by the California/Nevada Operations Office), and further discussed in Meeting of August 2, 2001 in Honolulu USFWS office between USFWS and Hawaii-based military coordinators of INRMPs.
[2] The MCBH IR program policy and responsibilities are detailed in Chapter 10 of MCO P5090.2A.

8.1.12 MILITARY MUNITIONS RESPONSE PROGRAM

After DoD uses the munitions for their intended purposes, the munitions may leave behind explosive, health and environmental hazards. Munitions response sites are discrete locations that are known or suspected to contain unexploded ordnance, discarded military munitions, or munitions constituents. The Military Munitions Response Program (MMRP), a comprehensive program within the Defense Environmental Restoration Program, has recently been established to address the potential health and safety hazards present at munitions response sites. For these sites, the MMRP will identify where and how much of this material is still present, set priorities for conducting response actions, and conduct necessary response actions. Many aspects of the MMRP are under development. Waikane Valley Training Area has been placed under this program (see Section 4.2.3).

8.1.13 NATURAL RESOURCES TRUSTEE AND NATURAL RESOURCES DAMAGE ASSESSMENT

MCO P5090.2A, Section 11104.6.a. and b. explain that CERCLA as amended by SARA (Part 101, Section 6), designates the US President as trustee for federally-protected or managed natural resources on behalf of the public. Natural resources include: "land, fish, wildlife, biota, air, water, groundwater, drinking supplies, and other such resources." In addition, Executive Order 12580 of January 23, 1987, National Oil and Hazardous Substances Pollution Contingency Plan designates DoD as one of the Federal agencies to be a Natural Resources Trustee. Hence, MCBH must act as a Natural Resources Trustee for those resources it manages in its lands and water parcels. Trustee responsibilities include, but are not necessarily limited to: notification of a natural resource injury, loss or threat when it occurs or is first discovered, and follow on response actions; cooperating with on-scene coordinator/regional project manager in coordinating assessments, investigations, and planning; and carrying out a plan for restoration, rehabilitation, replacement or acquisition of equivalent natural resources (see also Section 7.4.2, 2001 INRMP/EA, and Section 3.6.2, *MCBH Coral Reef Ecosystem Management Study*, Shafer et al. 2002).

MCBH's program to address Natural Resources Trustee and Natural Resources Damage Assessment (NRDA) obligations is still in the developmental stage. MCBH lacks a systematic and readily available database on marine resources at risk due to potential spills from Marine/Navy operations or outside sources. NOAA is updating environmental sensitivity maps covering all Hawaii coastal waters, including those surrounding MCBH properties. These maps are intended to assist in pre- and post-damage assessment planning, at spill drills and during actual response to Oil and Hazardous Substances spills. MCBH natural resource management staff have reviewed and helped refine these maps during an ongoing update process. However, more comprehensive and readily accessible maps and associated databases specific to coastal areas of MCBH properties are necessary for more effective MCBH compliance with natural resource damage assessment and spill response obligations.

8.2 CONSISTENCY WITH OTHER LAND USE PLANS, POLICIES, AND CONTROLS

8.2.1 CITY AND COUNTY OF HONOLULU

While City and Country ordinances and standards such as zoning and Special Management Area review do not apply to Federal actions or land uses on Federal reservations, the City does consider land uses on military installations in its development planning process and does exercise management authority over lands on the perimeter of an installation that are not the domain of the State. Details on the compatibility of each MCBH property with City and County of Honolulu designations for surrounding areas are provided in Section 10.1.2 of the 2001 MCBH INRMP/EA. No significant changes have occurred in the last five years and no inconsistencies are anticipated.

8.2.2 STATE OF HAWAII

State of Hawaii land use management regulations apply to lands surrounding MCBH parcels covered under this INRMP at MCBH-KB, MCTAB, Waikane Valley Impact Area, Camp H.M. Smith, and Puuloa Training Facility. The State Land Use Commission established land use district boundaries within the State in accordance with Hawaii Revised Statues (HRS) Chapter 205 and Hawaii Administrative Rules (HAR) Title 15, Subtitle 3, Chapter 15. There are four possible land use districts: Urban, Rural, Agricultural, and Conservation. Land uses within Urban districts are managed by the Land Use Commission and the respective counties, land use jurisdiction over the Rural and Agricultural Districts is shared between the Land Use Commission and respective counties, while Conservation lands are administered by the State Board of Land and Natural Resources. Details on the compatibility of each MCBH property with State designations for surrounding areas are provided in Section 10.1.1 of the 2001 MCBH INRMP/EA. No significant changes have occurred in the last five years and no inconsistencies are anticipated.

Coastal Zone Management

One of the Federal laws affecting coastal Marine Corps activities is the National Coastal Zone Management Act (CZMA).[3] Under this Act, MCBH is required to conduct its marine coastal activities in a manner that is consistent with the State's Coastal Zone Management (CZM) Program "to the maximum extent practicable." While the coastline, marine waters and resources within MCBH-KB's 500-yard jurisdiction are not within the bounds of the State's enforceable coastal zone program, complying to the "maximum extent practicable" with State CZM standards must be demonstrated through filing of a CZM consistency determination. Such determinations are required when any Federal activities might have a "spillover effect" outside of MCBH properties and federally controlled areas. Land, air, aesthetic, and water-based MCBH actions with transboundary effects beyond MCBH's coastal zone (e.g., storm water discharges, sedimentation from eroding shorelines, large-scale structures with off-base scenic impacts, excessive noise, and bright night light emissions) are subject to the CZM Federal consistency review by the Hawaii CZM Program. A 1999 Environmental Compliance Evaluation found that MCBH has not consistently coordinated its coastal zone activities with the State's CZM program, particularly in the area of shoreline erosion control. INRMP actions have been initiated to address this problem (see COA Component Plan 7.4.1 for further details).

[3] Certain sections of the CZMA pertaining to Federal consistency regulations have been revised as per the Final Rule published in the 71 FR 787-831 (January 5, 2006). (http://coastalmanagement.noaa.gov/consistency/welcome.html)

An additional aspect of littoral zone concerns is non-point source pollution. Recent amendments to the Clean Water Act (CWA) of 1972 and the 1972 CZMA emphasize this category of coastal zone concern. Thus, 1987 CWA amendments focus on controlling polluted runoff and the Coastal Zone Act Reauthorization Amendments of 1990 require states with CZM programs (like Hawaii) to develop and implement coastal non-point source pollution control programs. The new requirements are designed to protect coastal waters from polluted runoff from terrestrial (land) sources or non-point source pollution, now considered to be the largest single category of marine pollution worldwide (see Section 8.3.2).

8.3 REGIONAL PLANNING INITIATIVES

The following regional planning initiatives of other agencies are consistent with and complementary to many of the management actions in the MCBH INRMP. MCBH maintains close communication with counterparts in other agencies through direct interaction (e.g., project specific, interagency meetings, working groups, and task forces) and information sharing (e.g., exchange of relevant reports and/or guidance, and receipt of information through list-serve participation).

8.3.1 LOCAL

City and County of Honolulu Development Plans

Development Plans, a mandate of the City Charter, have been adopted by ordinance for eight geographic regions of O‘ahu since 1985. Development Plans provide general guidelines and policies for development by identifying permissible land uses on the Development Plan Land Use Map and various public facilities and improvements on the Development Plan Public Facilities Map. A revised plan, called the *Ko‘olaupoko Sustainable Communities Plan*, was adopted by the City Council in August 2000 (CCH 2000). The general policies pertaining to Ko‘olaupoko’s drainage system in the City’s plan are particularly complementary with MCBH’s INRMP COA Component Plan 7.2 Wetland Management and COA Component Plan 7.3 Watershed Management for its Ko‘olaupoko parcels. These City policies include: promote drainage systems to minimize non-point source pollution; make flood control modifications in such manner as to maintain habitat and aesthetic values; avoid and/or mitigate degradation of stream, coastline, and nearshore water quality; plan drainage-way improvements to integrate into the regional open space network; and view storm water as a valuable resource for retention and recharge of the aquifer rather than a nuisance to be quickly moved to coastal waters.

Kane‘ohe Bay Regional Council

Kane‘ohe Bay, adjacent to MCBH-KB, covers approximately 11,800 acres in the Ko‘olaupoko District and is considered one of Hawaii’s most precious natural resources. Kane‘ohe Bay simultaneously provides productive fisheries, excellent diving and snorkeling, protected areas for power boating and sailing, and beautiful shores for seaside living and recreation as well as military training. Historically, resource use conflicts in Kane‘ohe Bay have arisen because of its value to so many different interest groups. Regional planning began in the 1970s, and the Kane‘ohe Bay Regional Council was established in 1993 to facilitate the implementation of the Kane‘ohe Bay Master Plan (see details, Section 10.1.3.5, 2001 MCBH

INRMP/EA). As a Federal agency with considerable presence in the Kane‘ohe Bay environs for almost fifty years, MCBH actively participated in the Kane‘ohe Bay Task Force work during 1990-1992, albeit in an “ex officio” capacity. No inconsistencies between implementation of MCBH’s INRMP management actions and the work of the Kane‘ohe Bay Regional Council are anticipated. Since many of the INRMP actions are aimed to improve wildlife habitat, water quality, and flow into Kane‘ohe Bay from Mokapu sources, the goals and objectives to maintain the relatively pristine character of Kane‘ohe Bay waters are consistent between the two plans.

8.3.2 STATE OF HAWAII

Hawaii’s Implementation Plan for Polluted Runoff Control

Hawaii’s Implementation Plan for Polluted Runoff Control presents a five-year implementation plan for partnering with citizens, citizen groups, State and county agencies, and Federal agency stakeholders to prevent and reduce polluted runoff throughout the Ko‘olaupoko region (Hawaii Coastal Zone Management Program 2000). The next five-year implementation plan is currently being developed. MCBH has developed a strong watershed approach to non-point source pollution solutions (see Appendix A1). The actions and projects listed particularly in COA Component Plan 7.2 Wetland Management and COA Component Plan 7.3 Watershed Management are complementary to the objectives and implementation plan presented in the State’s plan. The need to coordinate with MCBH’s watershed restoration initiatives is acknowledged by the State in their document, and MCBH is listed as a partner in implementing solutions for the windward “Category One” Ko‘olaupoko region (see Table 5.3, Chapter 5, Watershed Approaches, of the 2000 implementation plan).

Hawaii’s Comprehensive Wildlife Conservation Strategy

Hawaii’s Comprehensive Wildlife Conservation Strategy (CWCS) outlines a statewide strategy for native wildlife conservation (Mitchell et al. 2005). The CWCS was prepared by Hawaii DLNR in order to continue participation in the State Wildlife Grant program administered by the USFWS. It comprehensively reviews the status of the full range of the State’s native terrestrial and aquatic species and presents strategies for long-term conservation of these species and their habitats. The seven priority conservation objectives identified for the State correlate to the overall goals of this INRMP.

1) Maintain, protect, manage, and restore native species and habitats in sufficient quantity and quality to allow native species to thrive;
2) Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication;
3) Develop and implement programs to obtain, manage, and disseminate information needed to guide conservation management and recovery programs;
4) Strengthen existing and create new partnerships and cooperative efforts; (Enhance partnerships with Federal enforcement agencies including the US Marine Corps, US Coast Guard, and NOAA Office for Law Enforcement)
5) Expand and strengthen outreach and education to improve understanding of our native wildlife resources among the people of Hawai‘i;

6) Support policy changes aimed at improving and protecting native species and habitats; and

7) Enhance funding opportunities to implement needed conservation actions.

Nu‘upia Ponds WMA and Ulupa‘u Head WMA are referenced in the document (p. 100-101) as key wildlife habitats on the island of O‘ahu. The nearshore waters surrounding Marine Corps Base Hawaii are also considered a key marine habitat on O‘ahu. The CWCS identifies the MCBH INRMP as an existing management plan and tool for MCBH property that addresses some of the threats listed in the Summary of Key Threats to Species and Habitats section. The recommendation of the CWCS is to continue existing management as outlined in the INRMP. MCBH was an active participant in development of the CWCS.

State of Hawaii Aquatic Invasive Species Plan

The *State of Hawai‘i Aquatic Invasive Species (AIS) Management Plan* was developed in response to the Federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, amended by the National Invasive Species Act of 1996 (Hawaii DAR/DLNR 2003). Its purpose is to guide a coordinated approach to implementing current management efforts, identifying remaining problem areas and gaps, and recommending additional actions which are needed to effectively address AIS issues in Hawai‘i. The goal and objectives identified in this document are compatible with goals and objectives identified by this INRMP and the *MCBH Invasive Species Management Study* (Garrison et al. 2002), in particular with regard to recommendations relating to invasive species.

Goal: To minimize the harmful ecological, economic, and human health impacts of AIS through the prevention and management of their introduction, expansion, and dispersal into, within, and from Hawai‘i.

To accomplish this goal, seven **objectives** relating to AIS have been identified:

1) COORDINATION and COLLABORATION: Improve the coordination and collaboration of people, resources, and efforts involved with AIS.

2) PREVENTION: Minimize the introduction and spread of AIS into and throughout the waters of Hawai‘i.

3) MONITORING and EARLY DETECTION: Ensure effective programs that allow for the early detection of new AIS and the monitoring of existing AIS.

4) RESPONSE, ERADICATION and CONTROL: Establish effective systems for rapid response, eradication, control, and restoration.

5) EDUCATION AND OUTREACH: Increase education and outreach efforts to ensure awareness throughout the State on AIS threats and solutions.

6) RESEARCH: Increase research efforts on key AIS species, associated issues, and economic impacts to allow for more effective management.

7) POLICY: Ensure State laws and regulations effectively promote the prevention and control of AIS.

The AIS Management Plan identifies a set of strategies and associated tasks to achieve these objectives. MCBH Environmental played a part in reviewing and contributing to the plan, which cites several MCBH reports, and includes a Case Study (6) "The Military's Contribution: Marine Corps Base Hawai'i Addresses Aquatic Invasive Species" documenting on-going success in controlling aquatic invasive species on MCBH property. The leadership and contribution of MCBH in controlling invasives in Hawai'i, especially of aquatic invasives in coastal wetland environments at Mokapu Peninsula, is acknowledged.

O'ahu Invasive Species Committee

The O'ahu Invasive Species Committee (OISC) is a voluntary partnership of private, governmental and non-profit organizations working to prevent new invasive species infestations on the island of O'ahu, to eradicate incipient invasive species, and to stop established invasive species from spreading. OISC is concerned with all non-native invasive species threatening agriculture, watersheds, native ecosystems, tourism, industry, human health and the quality of life on O'ahu. An updated Strategic Action Plan was published in 2006 that describes the OISC project and details the objectives and methods utilized to combat invasives on O'ahu (OISC 2006). The MCBH Senior Natural Resource Management Specialist maintains awareness of OISC activities by subscribing to their list-serve, participating in OISC meetings and coordinating related fieldwork (e.g., fountain grass surveys on MCTAB). OISC further assists MCBH by providing information and guidance on invasive species issues, control methodology, and surveillance for incipient invasive species outbreaks, through various interagency coordinated meetings, workshops, e-mail communications and some on-site survey and control assistance.

8.3.3 US Fish and Wildlife Service

Recovery Plan for Hawaiian Waterbirds

The USFWS prepares recovery plans for endangered species and delineates reasonable actions that are believed to be required to recover and protect listed species. The *Draft Revised Recovery Plan for Hawaiian Waterbirds: Second Draft of Second Revision* (USFWS 2005) addresses four species of Hawaiian waterbirds: the Hawaiian duck or koloa maoli (*Anas wyvilliana*), Hawaiian coot or 'alae ke'oke'o (*Fulica alai*), Hawaiian common moorhen or 'alae 'ula (*Gallinula chloropus sandvicensis*), and Hawaiian stilt or ae'o (*Himantopus mexicanus knudseni*), all listed as endangered. It provides habitat requirements, and details recovery information including goals, objectives, criteria for downlisting and delisting, and recovery actions. These proposed management actions are compatible with the MCBH INRMP, especially with those in COA Component Plan 7.1 Fish and Wildlife Management. MCBH's Nu'upia Ponds is identified as a core wetland on O'ahu for protection and management in order to recover the waterbirds. MCBH's INRMP is referenced as an important management plan detailing actions to enhance endangered waterbirds and their habitat. MCBH's management efforts to support regional conservation of the stilt population are recognized in the report, including the *MCBH Support of Hawaiian Stilt Regional Recovery in the Ko'olaupoko District, O'ahu* study (Rauzon et al. 2002). In 2005, MCBH contributed review comments to this most recent update of the recovery plan.

Shorebird Conservation Plan for Hawaii and Pacific Islands

USFWS is involved nationwide in cooperative partnerships to prepare Shorebird Conservation Plans for various regions of the United States. In Hawai'i and the Pacific, this partnership includes State DLNR, MCBH, and other government and non-government agency personnel (e.g., Ducks Unlimited, Bishop Museum, The Nature Conservancy) – all with waterbird habitat management responsibilities. The effort to improve waterbird habitat management in Hawai'i and the Pacific is outlined in the *U.S. Pacific Islands Regional Shorebird Conservation Plan* (Engilis and Naughton 2004). The goals and activities contained in this plan are compatible and complementary with the MCBH INRMP. MCBH participated, along with other stakeholders, in a July 2001 workshop and follow-on reviews of the plan. MCBH natural resources staff will continue to interact and cooperate with USFWS and other partners as the plan is implemented by using the monitoring manual for waterbirds that has been developed. MCBH natural resources staff will continue to monitor waterbirds as indicated in Section 7 of this INRMP; will participate in such regional initiatives to improve natural resources inventory, monitoring, and database management activities; and will update the INRMP appropriately. Such initiatives are complementary and consistent with the goals, objectives, and management actions detailed in this INRMP.

8.3.4 Other Interagency Partnerships and Activities

Cooperative Ecosystem Studies Unit

In 1998, P.L. 105-391 (Sec. 203) authorized and directed the Secretary of the Interior "to enter into cooperative agreements with colleges and universities, including but not limited to land grant schools, in partnership with other Federal and State agencies, to establish cooperative study units to conduct multi-disciplinary research…". In response and under existing cooperative agreement authorities, a network of Cooperative Ecosystem Studies Units (CESU) was developed. The Department of Defense became a Federal agency partner in the CESU network in 2000 through an amendment to the MOU (see Appendix G2).

The Hawai'i-Pacific Islands CESU, based at UH, with other Federal university and research institution partners spanning Hawaii and the Pacific was formed in 2004 (see Appendix G2). This coalition of governmental agencies, non-governmental organizations and universities, promotes research, education and technical assistance to support better stewardship of imperiled natural and cultural resources within the Pacific. CESU agreements allow each of the participating Federal agencies to efficiently transfer funds and duty station employees to university partners while maintaining responsibility for agency-sponsored activities within CESUs. MCBH, via HQ USMC, has succeeded in securing DoD funding and approval to join the Hawaii-Pacific CESU in 2005, contributing $10K toward membership in this interagency CESU. The MCBH Senior Natural Resource Management Specialist serves as DoD's technical representative to the Hawaii-Pacific CESU. The CESU mechanism is a promising vehicle for pooling limited resources of partner agencies in working toward solution of shared problems such as regional invasive mangrove encroachment on Hawaii's wetland/waterbird habitat.

SECTION 9
STAKEHOLDER INVOLVEMENT

9.1 PUBLIC INVOLVEMENT/OUTREACH

Public involvement/volunteer assistance in MCBH natural resources management; need for MCBH outreach and engagement in trans-boundary ecosystem management issues of public concern; and need to keep the public aware of MCBH INRMP program requirements, activities, and accomplishments are a well-integrated part of MCBH's integrated natural resources management program. At least 21 management actions under the current "Operational Stewardship" level of effort in INRMP execution involve some aspect of public involvement or outreach (see COA Component Plans 7.1, 7.3, 7.4, 7.5, and 7.6 for details). Another 14 management actions under the current level of effort reflect a sustained MCBH commitment to interagency partnering (see COA Component Plans 7.1, 7.4, 7.6, and 7.7 for details). Table E3-2, summarizing all management actions, is included in Appendix E3.

Over the past twenty-five years, implementation of MCBH actions that combine military maneuvers, agency partnering, and community volunteers toward a common goal have resulted in lasting benefits. These benefits include, for example, over 25 acres of invasive mangrove cleared from MCBH wetlands; increased endangered stilt numbers at MCBH (from 60 to 160 over 20 years); and increased community confidence in MCBH as conscientious conservation stewards. Transferable lessons learned are shared with a wide public audience through the media, websites, publications, and conferences in which MCBH INRMP implementation staff and activities are represented at local, national, and international levels. Recent examples include: August 2005 White House Conference on Cooperative Conservation, attended by MCBH natural resources and military operator staff and partner representatives from Hawai'i Sierra Club, Hawai'i Audubon Society, and Hawai'i State DLNR along with over 1,000 other participants from across the nation; a 2005 DoD-National Wildlife Federation (NWF) report "Under Siege: Invasive Species on Military Bases" cites MCBH successes in invasive species control, and is posted at NWF's website; Sierra Club's Hawai'i chapter newsletter (2003) and national Sierra Club magazine (2005) applaud their MCBH partnership[1]; and Hawaii Audubon Society's 'Elepaio newsletter (2005) documents their MCBH partnership (see Appendix G2 for documentation).

[1] Since 1982, the Senior Natural Resource Manager Specialist has been the MCBH lead in forging a long-term partnership with the Sierra Club Hawaii Chapter who has 'adopted' MCBH wetlands and provides bi-monthly mangrove weeding service projects as a regular part of their outing program schedule, attracting military as well as civilian participants. In addition, every five years since 1983, Sierra Club High School Hiker's "Ecology Camps" are hosted on MCBH, including service projects and environmental education tours, coordinated with the Base Command through MCBH Environmental (see COA Component Plan 7.6.1).

MCBH's natural resources management successes are scientifically documented, published, and internationally shared. For example, MCBH was recently involved in internationally-attended conferences including: an International Union for Conservation of Nature conference about invasive species management successes, after which conference proceedings included MCBH representation (Rauzon and Drigot 2002); and the Asia-Pacific Center for Security Studies Conference (Nov. 2002), at which the MCBH Senior Natural Resources Management Specialist's paper on civilian-military cooperation in Hawaii with MCBH examples was presented (and is in continued use in training classes by Center staff instructors (C. Jasparro, pers. comm., 2005)).

Conservation Education/Community Relations/Outreach

The MCBH natural resources staff interact extensively with the public, both on- and off-base, in a variety of ways. Between 2002 and 2005 over 1,700 individuals (from both on and off base civic clubs, schools, businesses, agencies, environmental and Native Hawaiian groups) participated in environmental service and educational tours led by natural resources staff to improve wildlife habitat, repair bird nesting structures, remove invasive plants, install native plants, count birds, clean beaches and/or carry out field research (see Appendix G1). Almost 1,500 were accommodated in off-site presentations (at schools, community gatherings, professional meetings) by natural resources staff. Details in Appendix G1, which displays data on types and numbers of individuals and events accommodated, are shown for a broader time span (1999 – 2005) to demonstrate that this is not an isolated phenomenon but a routine occurrence. The detail also shows the rich variety of types of public and private organizations represented within limits of staff availability, other work priorities, and/or environmental constraints.

In addition, for example, during the FY04-FY05 time frame, at least 3,330 individual military units, other tenants and/or family members were reached through briefs, booths, and brochures about MCBH's natural resource assets and sensitivities, conservation programs, and opportunities to participate in environmental tours or volunteer projects. This is a regular trend as these briefs and interaction opportunities are scheduled on Base throughout the year.

Section 4 of this INRMP contains more detail about how the natural resources staff incorporate extensive public service work into the way they perform their duties, with accolades received from military operators, cooperating agencies, professional peers, as well as from various environmental and service organizations involved.

In addition to collaborating with the publics served in the above way, the public has opportunities to comment in connection with associated environmental reviews and regulatory permit requirements for site-specific projects discussed in this plan (see Table 3.2).

In addition, the Command has and will engage in special public outreach efforts, based on level of public interest and other factors, when implementing pertinent projects in the integrated natural resources management program.

9.2 PARTICIPATION IN STAKEHOLDER PLANNING AND MANAGEMENT ACTIONS

MCBH conducts ongoing coordination and cooperation with both military and non-military agency partners in carrying out INRMP objectives in such a manner that also services the partner agencies' objectives. For example:

1. Conducting routine natural resources management activities including: close coordination with troops in annual Nu'upia Ponds Mud Ops AAV maneuvers to control pickleweed in endangered stilt habitat and accomplish AAV training objectives; and close coordination with Federal/State wildlife biologists in State-wide waterbird counts, spill response exercises, invasive species surveys, and individual project reviews.
2. Permit and review consultation with relevant agencies occurs on a project or incident basis (e.g., NEPA, Section 7 Endangered Species Act consultations, and permit coordination required for "must fund" INRMP projects) (see Section 3.3.).
3. As detailed in Section 8, there are many plans (produced in various units on Base and/or maintained by off-base partner agencies) in which MCBH's natural resources management program is cited as a partner in carrying out some of the actions listed.
4. On- and off-base interagency cooperation in implementing marine conservation law enforcement and resource management activities including: MCBH's waterfront operations active-duty Navy staff assist MCBH, State, and Federal conservation enforcement officers to control illegal fishing, net laying, and reef diving activities within surrounding bays. They also help retrieve abandoned fish nets that would otherwise harm marine life. Throughout FY04 – FY05, for instance, they teamed with MCBH natural resources and USFWS staff to provide boat support for divers from cooperating agencies doing a systematic rapid biological assessment within MCBH's 500-yard seaward security buffer zone (See Section 6.1.3 and COA Component Plan 7.4, INRMP Project HI20009). Currently, USFWS and State conservation enforcement vessels are moored at MCBH waterfront operations under a cooperative agreement. This partnering to share staff, equipment, and access has enabled MCBH to stretch limited dollars to expand interagency data sharing and conservation enforcement benefits on behalf of the rich public trust marine resources under MCBH's stewardship.

9.3 AWARDS AND RECOGNITION

A long track record of numerous awards and certificates of recognition for MCBH natural resources program and staff accomplishments, posting of MCBH accomplishments in outside publications and websites, and successful partnering with agencies and public groups testify to MCBH's positive interaction with regulators and stakeholders. Examples of these awards and types/sources of recognition are listed in Appendix G2 and are also referenced in Section 4.

The ability to obtain permits to haze protected birds from runways; perform limited military maneuvers and recreational activities near sensitive wildlife habitats; dredge sensitive wetlands as part of environmental restoration projects; sustain amphibious training in sensitive MCBH waters; and obtain concurrence from historic preservation and Native Hawaiian groups also indicate good relations.

Favorable regulator review of our INRMP implementation progress is reflected, most recently, in MCBH's nomination by the USFWS's Pacific Islands Fish and Wildlife Office for the Service's 2004 Military Installation Conservation Partner Award, citing that MCBH "completed, funded, and implemented its INRMP on time, including timely review and submission to the Service for Section 7 (Endangered Species Act) consultation and National Environmental Policy Act (NEPA) compliance." (See Appendix E2.)

Favorable recognition among military peers is reflected, most recently, in that during May 2006, MCBH was recognized as winner of the 2005 Secretary of Defense Conservation of Natural Resources – Small Installations program award in a national interservice military competition. MCBH also was the winner of three 2005 Secretary of the Navy awards in the following categories: Natural Resources Conservation – Small Installations; Natural Resources Conservation – Individual (Drigot); and Environmental Quality – Non-Industrial Installations.

9.4 COOPERATIVE PREPARATION AND UPDATES OF THE INRMP

Section 2904 of the 1997 SAIA specifically requires that installation INRMPs reflect "mutual agreement" on the "conservation, protection, and management of fish and wildlife resources" among the installation; the Secretary of Interior, acting through the Director, USFWS; and the head of each appropriate State fish and wildlife agency (see Appendix A3).

As noted above, in Section 3, Appendices E2 and G, MCBH regularly coordinates with and receives feedback from partner agencies on a range of activities from data collection and management, to permit preparation and acquisition, to plan review, implementation progress evaluation, and update. Documentation of stakeholder review comments on the draft updated INRMP and how they were addressed in the final document is included in Appendix G4 and G5. MCBH will continue to interact with stakeholders as advisory partners during the plan's implementation, regular review, and update.

9.5 COOPERATIVE CONSERVATION

In current times of shrinking staffs and budgets, increased terrorism, increased international military conflict, and emphasis on homeland security, the most successful way to sustain MCBH's exemplary record of natural resources conservation stewardship is to commit to a continuing and—where possible—increased level of effort in cooperative conservation. The President's Executive Order to Facilitate Cooperative Conservation (2004) launched a significant initiative in this regard. At the White House Conference on Cooperative Conservation (2005), MCBH natural resources staff and some of MCBH's partner representatives from both military and the public (AAV military operator, Sierra Club and Hawaii Audubon representatives) who attended came away with a renewed commitment to this approach.

As of 2006, several new pieces of national legislation are being proposed that would facilitate cooperative conservation initiatives, with Department of the Interior and NOAA Fisheries being the lead agencies for carrying out many of them. This would strengthen their existing mandate in this regard through the Sikes Act (see http://cooperativeconservation.gov for details). The State DLNR's 2005 Hawaii's

Comprehensive Wildlife Conservation Strategy states a major goal to be “strengthen existing and create new partnerships and cooperative efforts; (Enhance partnerships with Federal enforcement agencies **including the US Marine Corps**, US Coast Guard, and NOAA Office for Law Enforcement.)” (*emphasis added*) (see Section 8.3.2).

DoD recently joined the Hawaii-Pacific Cooperative Ecosystem Studies Unit (CESU) (see Section 8.3.4 and Appendix G2 for details), partly in order to facilitate MCBH and other military agencies in Hawaii participating in trans-boundary, jointly-supported cooperative conservation initiatives, such as presented in COA Component Plan 7.4.1 (INRMP Projects HI20009 and HI0920017). MCBH’s Sikes Act Partners (USFWS, NOAA Fisheries, and State DLNR), when reviewing this document, are encouraged to carefully review the listed management actions and present comments that reflect areas where mutual partnering and cost-sharing can be most effectively implemented in the years to come to reinforce mutual mandates for cooperative conservation among all concerned.

This page intentionally left blank.

SECTION 10
LIST OF PREPARERS

Diane C. Drigot, Principal Author and MCBH INRMP Project Manager

Senior Natural Resources Management Specialist, MCBH Environmental Department

Ph.D., Natural Resources - Policy, Planning, Management (University of Michigan)

M.S., Natural Resources Planning, (University of Michigan)

A.B., Conservation of Natural Resources (Barnard College, Columbia University)

Years of Experience: 35

Kristin N. Duin, MCBH Consultant

Principal, Sustainable Resources Group Intn'l, Inc.

M.S., Energy and Resources (University of California, Berkeley)

B.S., Biological Sciences (Stanford University)

Years of Experience: 12

Waterbird Database Creation and Report Compilation Assistance by:

Christine Iriarte Volinski, MCBH Environmental Department Contractor

B.S., Wildlife and Fishery Science (Pennsylvania State University)

Years of Experience: 6

This page intentionally left blank.